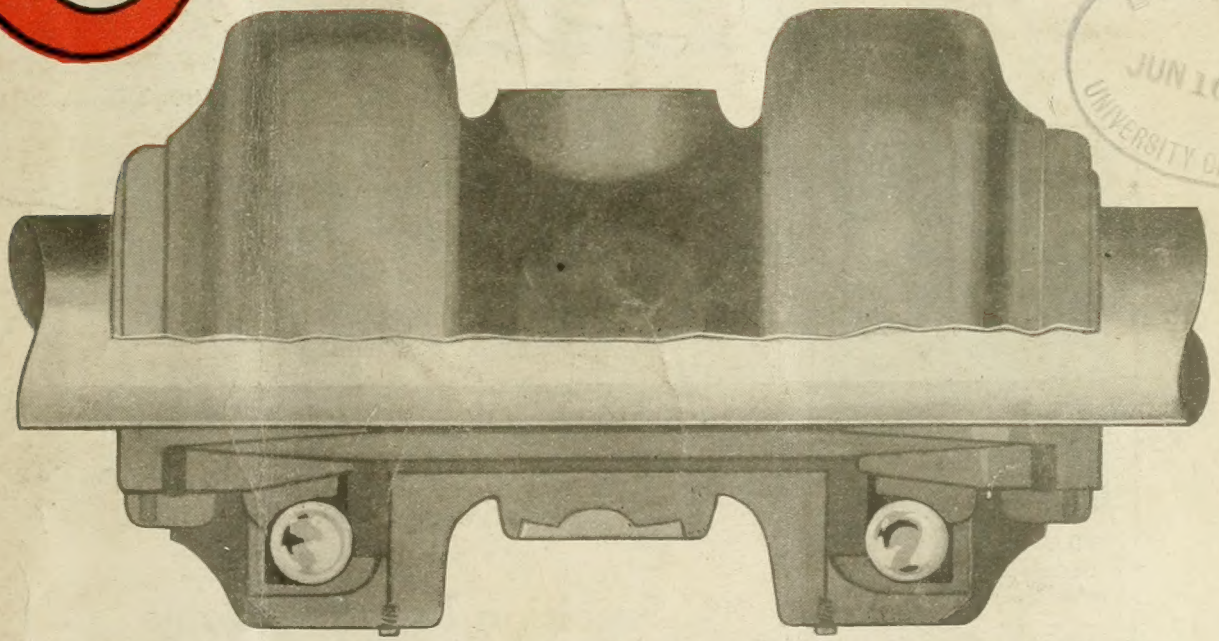
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 3. Publication Office: Toronto, January 16, 1919 Subscription Price $3.00 per Year

CHAPMAN
DOUBLE BALL
BEARINGS



LIBRARY JUN 16 1922 UNIVERSITY OF TORONTO

Here are some of the reasons why the Pierce-Arrow Motor Car Company, Bethlehem Steel Company and other big concerns use Chapman Double Ball Bearings.

They reduce power costs 15% to 40%.
They are entirely drip-proof.
They are dust and dirt-proof.
They require lubrication only once a year.
They are built to fit any hanger frame.

We also manufacture Annular and Thrust Bearings for automobiles and machinery.

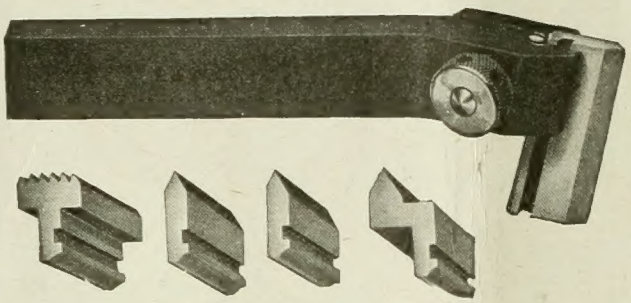
Chapman Double Ball Bearing Company of Canada, Limited

339-351 Sorauren Avenue, Toronto, Ontario

TRANSMISSION BALL BEARING CO., Inc., 32 West St., Buffalo, N.Y.

SMALL TOOLS

P. & W. Threading Tools



Chaser | Single Point | Offset | Double Onset

PROMPT SERVICE

is assured at our nearest office. Place your order there to-day.

Uses the same holder for chasers and single point cutters. The change can be made in a jiffy.

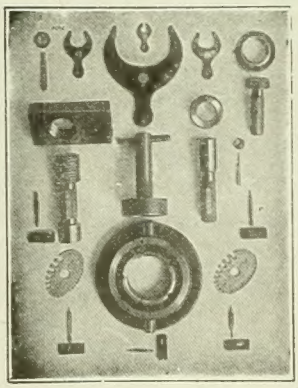
A few of its advantages:

Threads can be cut very close to shoulder.

Tools are sharpened by simply grinding off top of cutter.

Combines economy with all features essential in a threading and forming tool.

Cutters have 15 deg. clearance, which experience has taught gives the longest wear in various metals.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

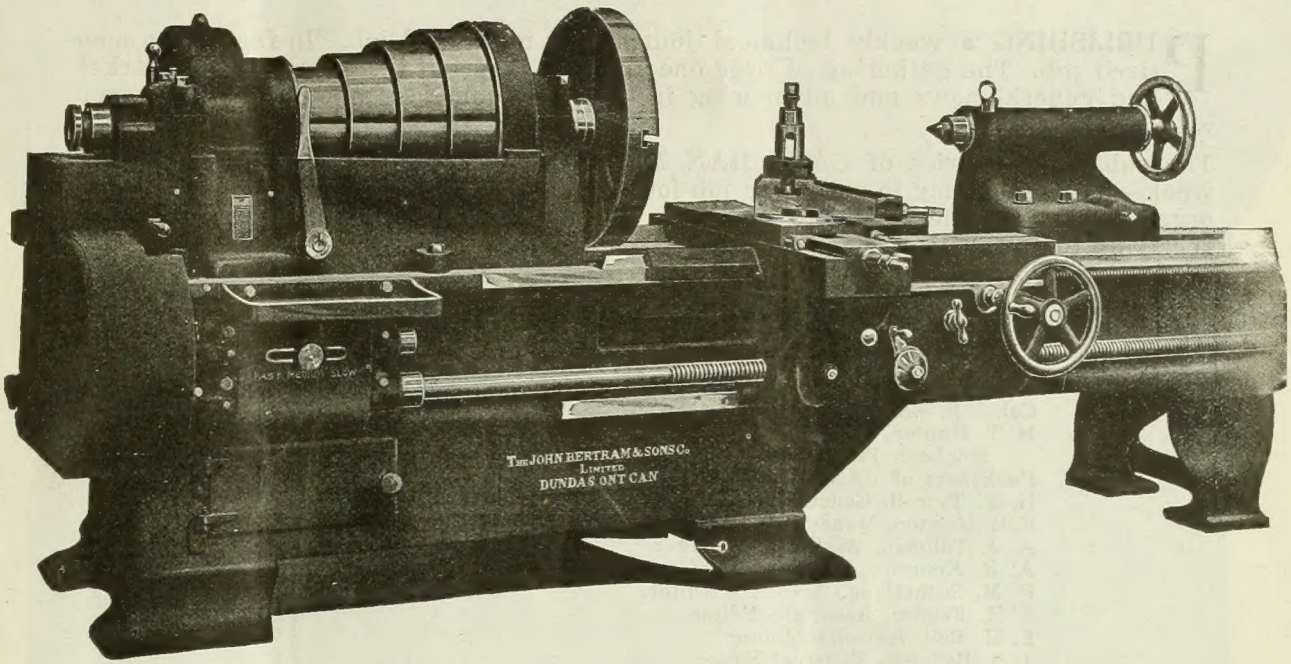
PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO JANUARY 16, 1919

Who's Who With Canadian Machinery

PUBLISHING a weekly technical journal is a man-sized job. In fact it is a men-sized job. The gathering of over one hundred pages of technical matter, market and general news and advertising involves an immense amount of work each week.

The subscription price of CANADIAN MACHINERY—$3.00 per year—six cents a week—has a tendency to make the job look small. Let us give you some idea of the organization it is necessary to maintain in order to give you the service you are receiving to-day.

Members of the Staff
CANADIAN MACHINERY

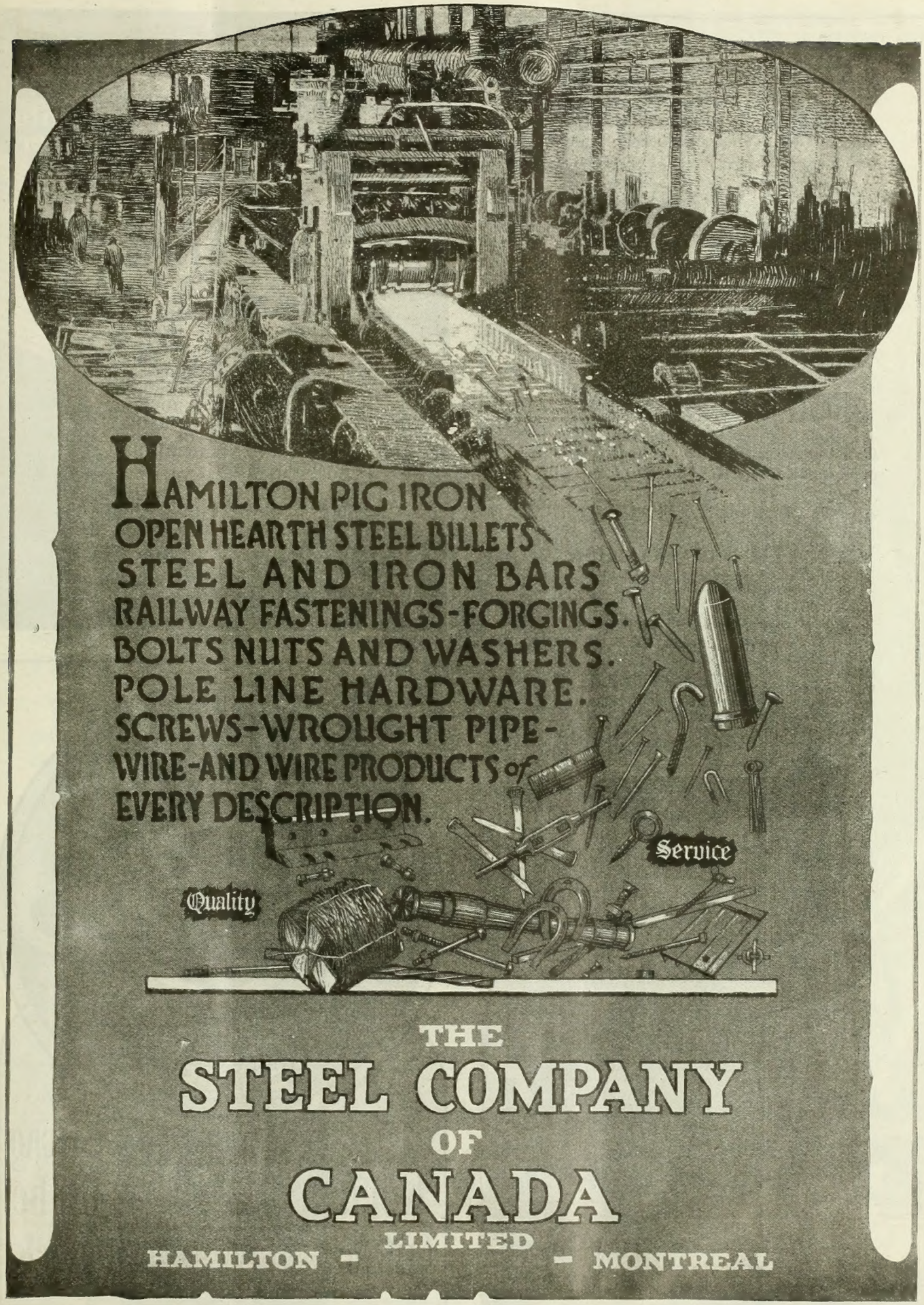
Col. J. B. MacLean, President,
H. T. Hunter, Vice-President.
MacLean Publishing Co., Limited.
Publishers of CANADIAN MACHINERY.
H. V. Tyrrell, General Manager.
B. G. Newton, Manager, CANADIAN MACHINERY.
A. J. Tallman, Assistant Manager.
A. R. Kennedy, Editor-in-Chief.
F. M. Sutherland, Associate Editor.
J. H. Fenner, Associate Editor.
F. H. Bell, Associate Editor.
J. H. Rodgers, Montreal Editor.
J. M. Fraser, Ottawa Editorial Representative.
G. E. McCarrell, Ontario Circulation Representative.
P. H. King, Montreal Circulation Representative.
J. S. Scott, Maritime Provinces Circulation Representative.
H. D. Tressidder, Montreal Manager.
C. W. Buchanan, Circulation Manager.
Jos. N. Robinson, Toronto and Hamilton Adv. Representative.
S. S. Moore, Ontario Advertising Representative.
C. W. Byers, Western Representative.
A. H. Byrne, Chicago Representative.
A. R. Lowe, New York Representative.
C. L. Morton, Boston Representative.

In addition to the above we maintain a service department, where five artists and advertisement writers are employed. Then there is our make-up department, composing, press and mailing, business and subscription departments, where many printers and others are employed. We have, too, our regular correspondents and contributors in various industrial centers in Canada and the United States.

Recently one of our readers called at our office and was shown through the different departments. He was surprised and went away saying he had a wholesome respect for such an organization.

We have tried to picture to you just how thoroughly we are equipped to give you service. CANADIAN MACHINERY'S chief object in life is to serve—to multiply good ideas and pass them on to you and to hundreds of others. CANADIAN MACHINERY or any high-grade journal can be wonderfully helpful or it can be of no use at all. It depends on the individual. Some profit by reading. Some do not.

Canada will need men **who know** and need them in large numbers, and need them perhaps long before we imagine. We are putting the best into CANADIAN MACHINERY. It is up to you to get yours out of it.


HAMILTON PIG IRON
OPEN HEARTH STEEL BILLETS
STEEL AND IRON BARS
RAILWAY FASTENINGS-FORGINGS.
BOLTS NUTS AND WASHERS.
POLE LINE HARDWARE.
SCREWS-WROUGHT PIPE-
WIRE-AND WIRE PRODUCTS of
EVERY DESCRIPTION.
Service
Quality
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON - - MONTREAL

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

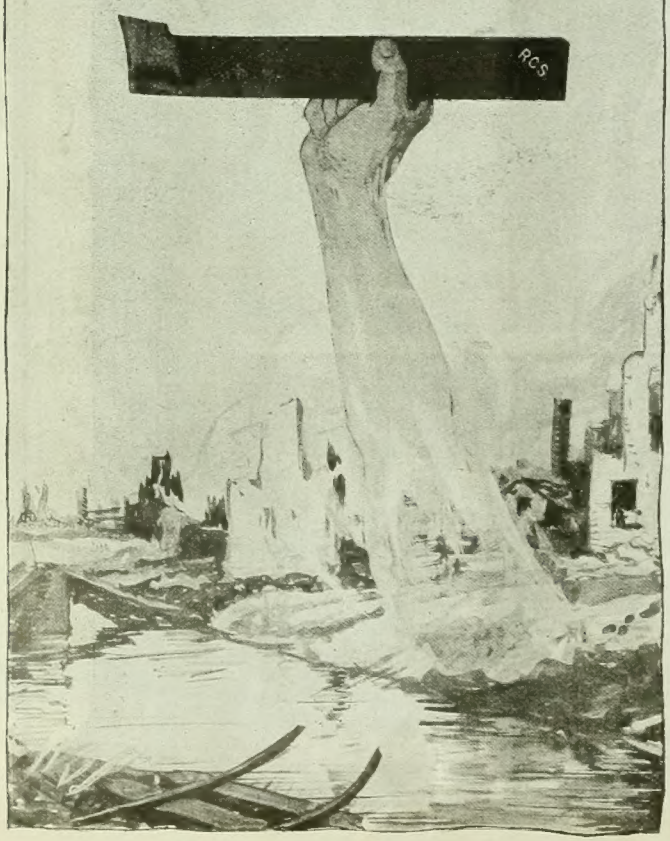
Is the avowed Enemy of Waste and Inefficiency, and allied with Life. Save Time, Save Life

Are your Tools made of Red Cut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

BOSTON
BUFFALO
CINCINNATI
CHICAGO
CLEVELAND
DETROIT
PITTSBURGH
MONTREAL
NEW YORK
TORONTO



Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK
SS
"DOUBLE ESS"

PROMPT SHIPMENTS from large stock

WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

VULCAN CRUCIBLE STEEL CO.
Aliquippa ESTABLISHED 1900 Pa: U.S.A.
Represented in Canada by Messrs Norton Callard & Company MONTREAL QUE.

Strong in the Neck

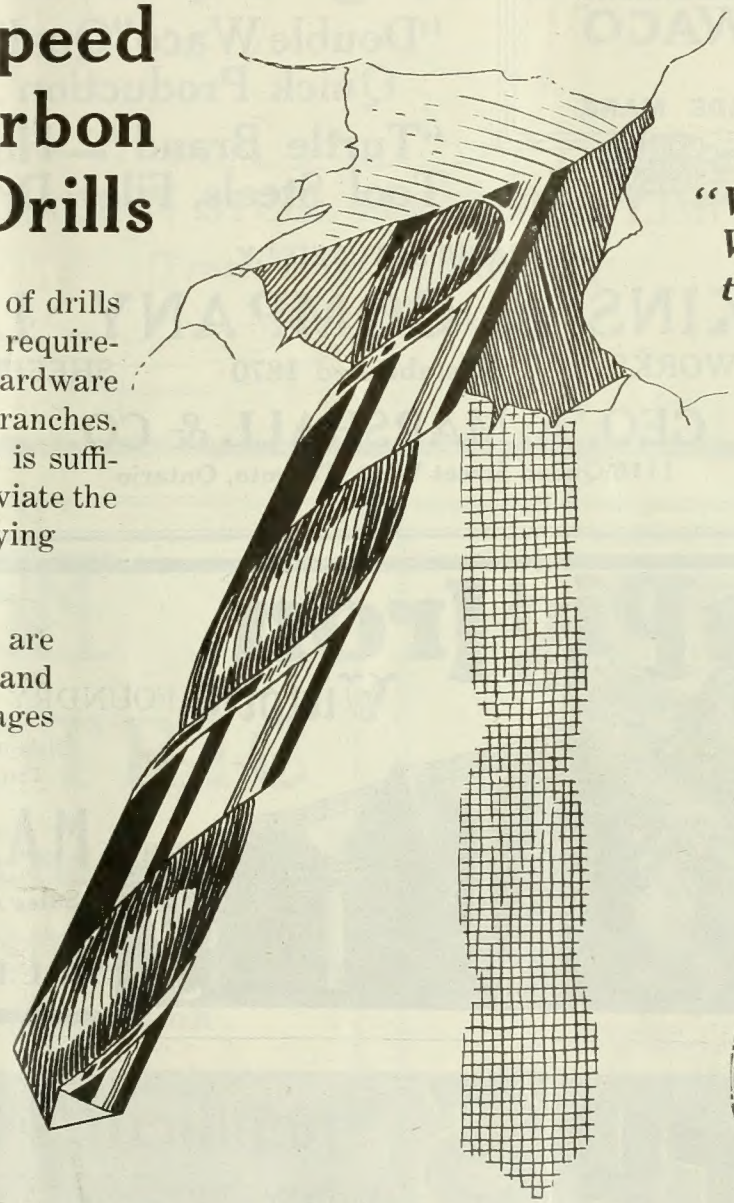
WILT

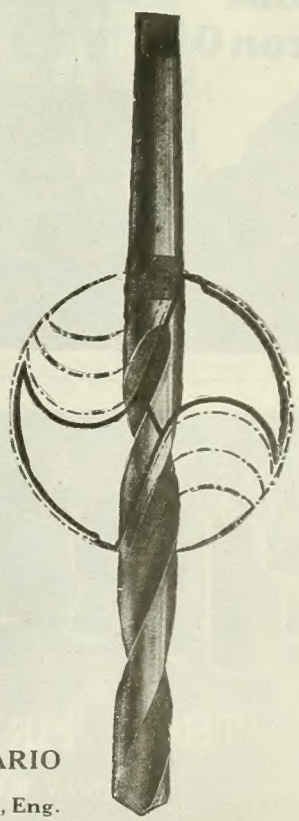
High Speed and Carbon Twist Drills

"Where There's a Wilt---There's the Way."

The **"WILT"** line of drills provides for the requirements of the hardware trade in all its branches. The **"WILT"** line is sufficiently large to obviate the necessity of carrying a mixed stock.

"WILT" drills are put up in neat and convenient packages for the trade, and will reach you in good condition. Wholesalers and retailers can sell **"WILT"** drills with the assurance that the final purchaser will receive absolute satisfaction.





Sell WILT Products

WILT TWIST DRILL CO.
OF CANADA, LIMITED

WALKERVILLE :: :: :: ONTARIO

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

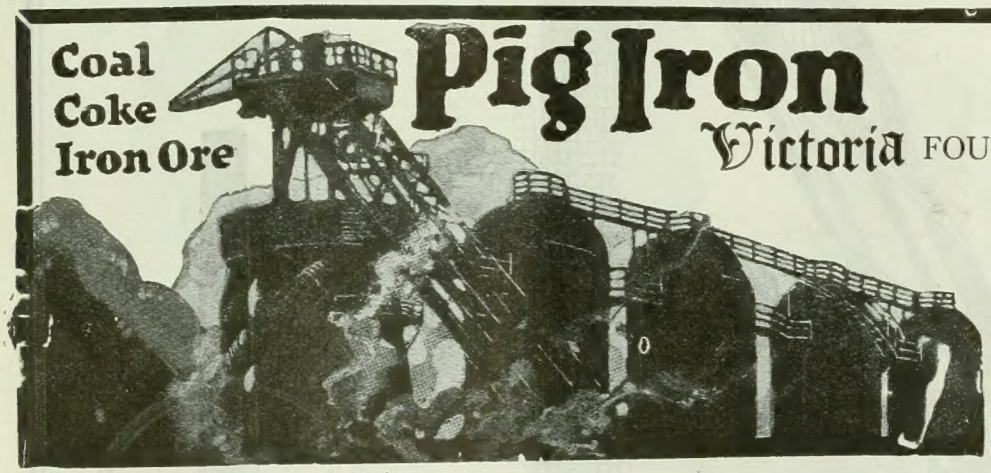
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore



Pig Iron

Victoria FOUNDRY & MALLEABLE

Mabe dy The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & CO.

Sales Agents, CLEVELAND

Canadian Office:
703 C.P.R. Bldg., Toronto

FIRTH'S

Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

LOCOMOTIVE CASTINGS

CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

E&M

ELECTRIC
Steel Castings

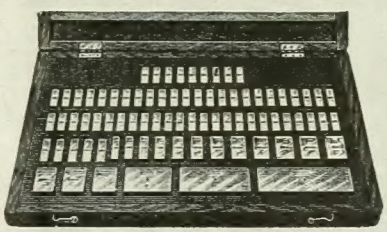
High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

Guaranteed Accuracy .00001"



JOHANSSON GAGE BLOCKS

These Gages are the standard with such organizations as Imperial Munitions Board, Canada Cement Company, Willys-Overland Company, Dominion Arsenal, Dominion Cartridge Company, The Turnbull Elevator Mfg. Co., Holden-Morgan Co., and Brown Engineering Corp.

Any one of thousands and thousands of measurements to .0001" can be made up by any shop man in a few moments.

They take the place of less accurate tools both for producing work and checking its accuracy. One use nowadays is to set and check Johansson Adjustable Snap Gages in those shops that have taken advantage of the Limit System.

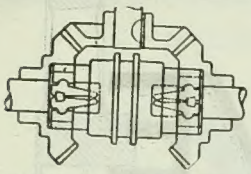
Write us for further information. Better still, let us demonstrate in your own shop.

H. E. STREETER
523 New Birks Bldg. - Montreal

Johansson Gage Blocks. Special Taps, Hobs, Reamers and Cutters; Bench **Lathes**, Surface Grinders, Magnetic Chucks, Prestowich Gages, Micrometers, etc.

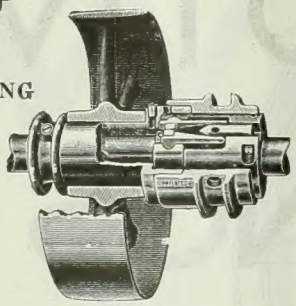
If any advertisement interests you, tear it out now and place with letters to be answered.

THE JOHNSON FRICTION CLUTCH

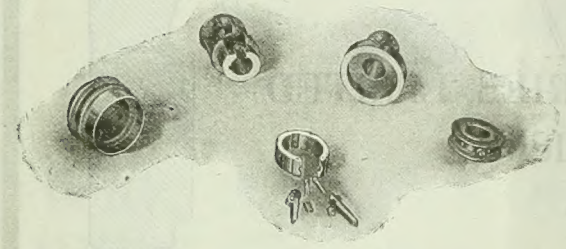


DOUBLE CLUTCH
IN NEST OF GEARING

Note the parts of this Clutch



STANDARD CLUTCH with Pulley Clutch Engaged



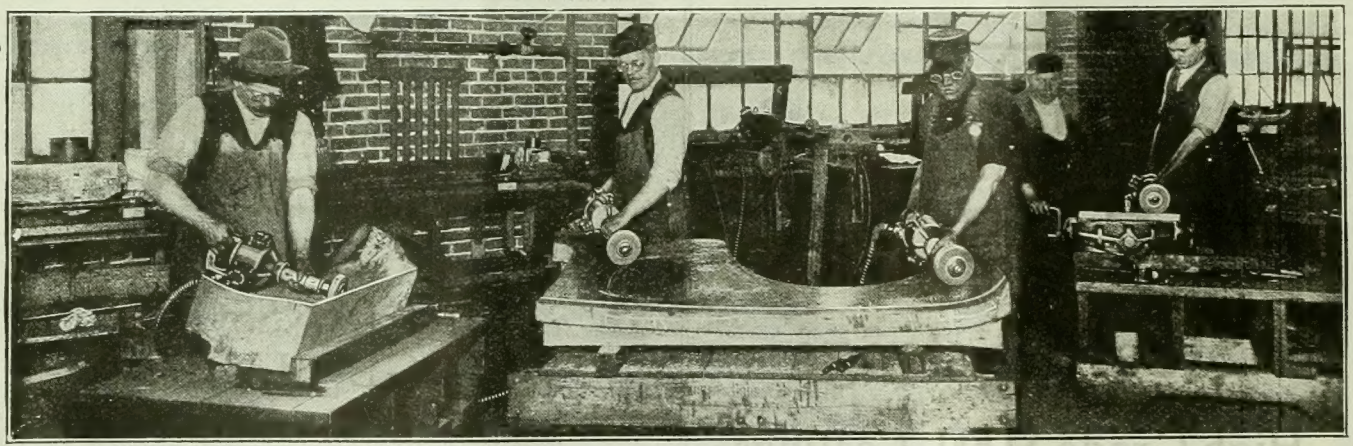
FOR SERVICE

The leading engineers are specifying *Johnson Friction Clutches*. Our years of experience in manufacturing friction clutches places us in an excellent position to take care of your requirements. The *Johnson Friction Clutch* has but few parts and is easily modified to meet any conditions. Have *you* noticed the concerns who are using *Johnson Friction Clutches?* There's a reason. Service is in back of it all. What are your requirements?

You Should Have Our Yellow Data Sheets and Booklet "Clutches As Applied In Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal. The Canadian Fairbanks-Morse Co., Ltd., Toronto and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



How One Plant Uses The "LITTLE DAVID" GRINDER

CANADIAN INGERSOLL-RAND CO., LTD.

With Offices at

SYDNEY, SHERBROOKE, MONTREAL, TORONTO, COBALT, WINNIPEG, NELSON, VANCOUVER

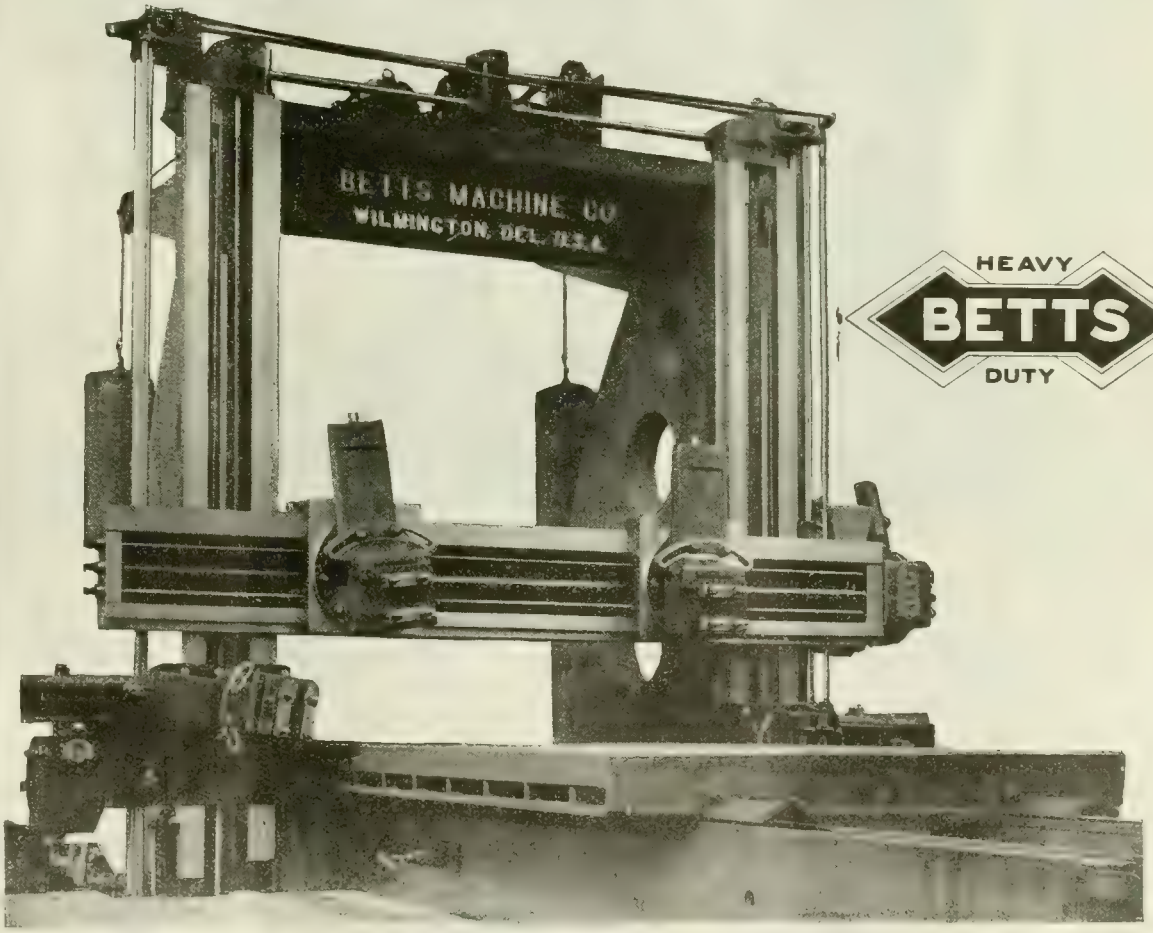
BETTS

"The Highest Type of Heavy Duty Machine Tools"

WHEN a thing is so well done that it stands out head and shoulders above everything else in its field, you can always be sure that the men back of it have concentrated every energy and focused every force on that one thing, for years or possibly a lifetime. You can be sure that they haven't scattered their attention or divided their energies.

Betts Heavy Duty Machine Tools are the result of concentration and combined effort, and their popularity is due to superiority of design, the accuracy and durability built into the tools and the backbone to stand up under the severe service required.

Complete information regarding any Betts Tool and specifications will be forwarded on request.



BETTS MACHINE CO.

408 Blossom Rd. Rochester, N.Y.

Formerly of WILMINGTON, DEL.

FORD-SMITH

Milling Machines

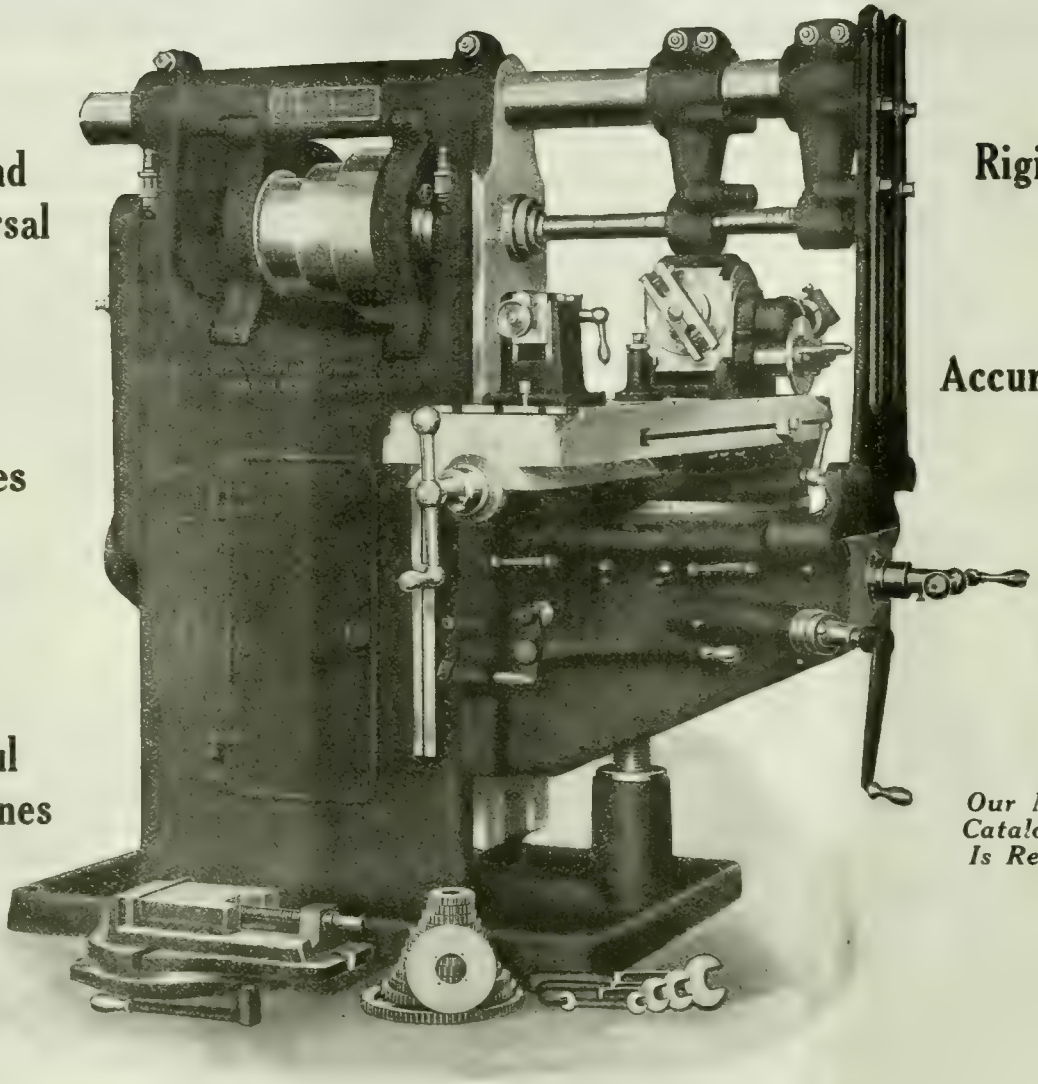
Plain and Universal

Rigid

Accurate

4 Sizes

Powerful Machines



Our New Catalogue Is Ready

Extract from letter just received from one of the largest concerns of its kind in the British Empire—The Birmingham Small Arms Company, Limited, Birmingham, England; a user in a large way of Ford-Smith Millers:—

"We have your letter of the 4th instant, regarding the Ford-Smith Milling Machines which you supplied to us some time ago. In reply, we may say that so far these machines have proved very satisfactory."

MANUFACTURED IN CANADA BY

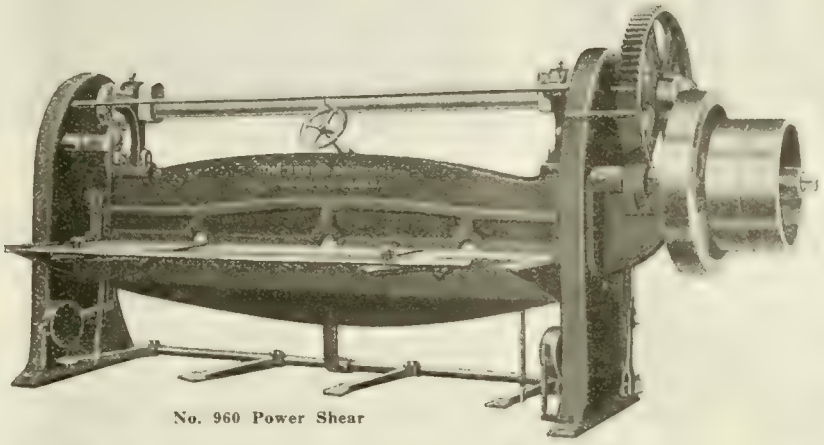
The Ford-Smith Machine Co., Limited

Hamilton, Ontario, Canada

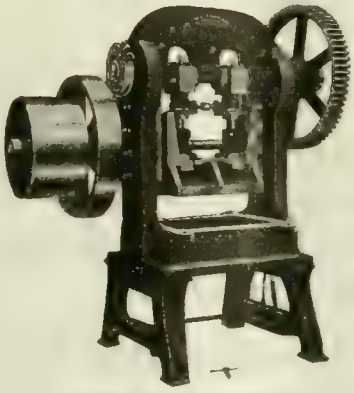
Makers of Milling Machines, Grinders and Special Machinery

Agent for Great Britain; W. E. Storey, 3 Arundel St., London, Eng.
Agent for United States and Foreign Countries: Alf. Herbert, Limited 54 Dey St., New York

Stood The Test



No. 960 Power Shear



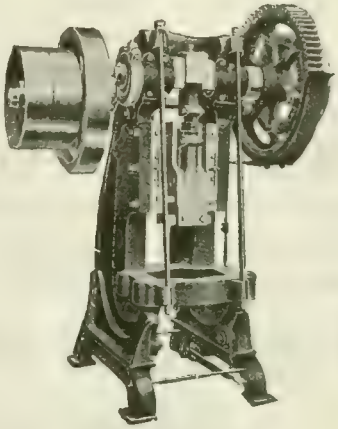
No. 20½ Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

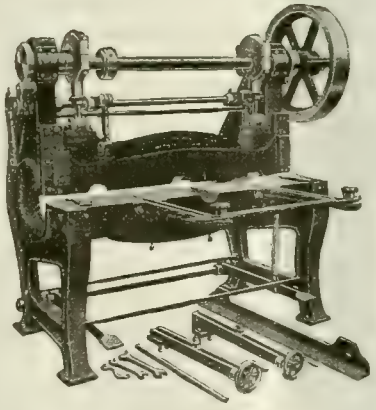
Inexperienced help and 24 hours daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

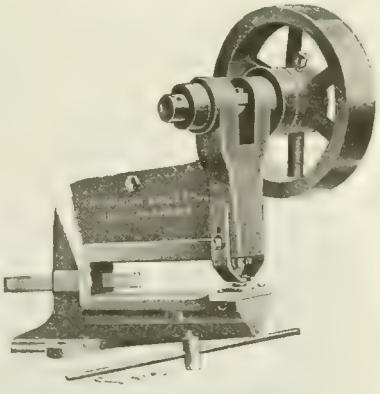
Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 215 Power Press



No. 404 Shear

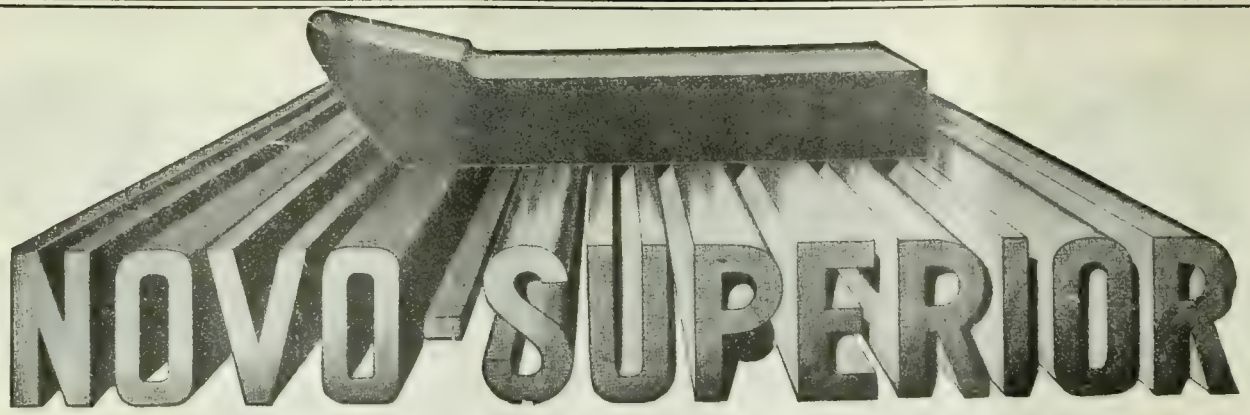


No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

If any advertisement interests you, tear it out now and place with letters to be answered.



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

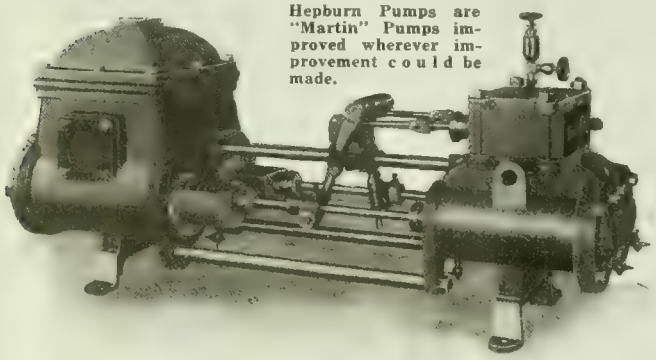
We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws—for wood and for hot or cold metal cutting
Machine Knives—for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James Street, Montreal

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

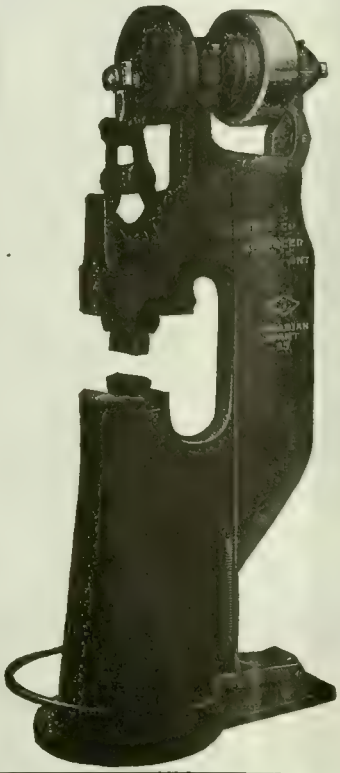


Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

If You Need a

POWER HAMMER



of uncommon strength throughout — a hammer constructed to deliver work of surpassing quality in great quantity, and to keep everlastingly at it—

You Need Jardine's

Note a few particulars:

Hammer slide is a steel casting; so is the ram, and connecting bolts for the ram are machined from solid steel bar.

Hammer and anvil dies of properly tempered, highest grade tool steel are held in machine seats by tapered keys in the ram and anvil block, so there's no need to put taper on the dies.

Jardine's Canadian Giant Power Hammer has never failed.

Write for Catalog

A. B. JARDINE & CO.
Limited
Hespeler, Ont., Canada

RICH RICH

Rich for Rush Work

All work is produced under high pressure these days but often something turns up that requires pushing through with a rush. In cases like these you need RICH DRILLS. They have a capacity for speed possessed by no other drills and they do clean, accurate work—no feed too heavy, no speed too high.

RICH DRILLS AND REAMERS are **Forged** (not milled) from best high speed steel.

Machinery, Machine Tools, Factory and Mill Supplies

Our line of machinery and general equipment is strictly modern in design. If you have any problems to solve let us help you. Quick Service.

Standard Machinery & Supplies, Limited

261 Notre Dame St. W., MONTREAL, Que., Can.

Western Representative—Wm. W. Hicks, 567 Banning St., Winnipeg, Man.

RICH RICH

Electrite

Electric furnaces, automatically regulated, the most modern methods, and **the introduction of Uranium** — make this a steel of truly remarkably cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

Uranium

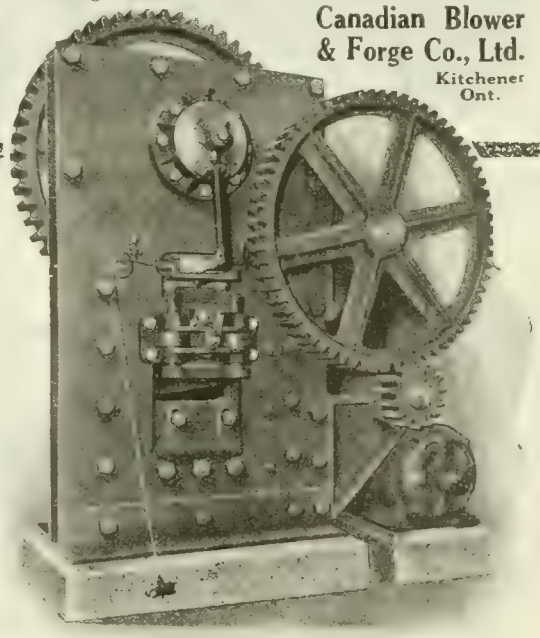
CANADIAN ARMOR PLATE

PUNCHES, SLITTING SHEARS, and BAR CUTTERS are dependable. They are built of "Armor Plate" steel—tensile strength 75000 lbs. per square inch—7½ times as strong as cast iron.

That means a lighter and stronger machine—a machine built to take a lot of punishment. **Write for Catalog P S-16**

Canadian Blower & Forge Co., Ltd.

Kitchener Ont.



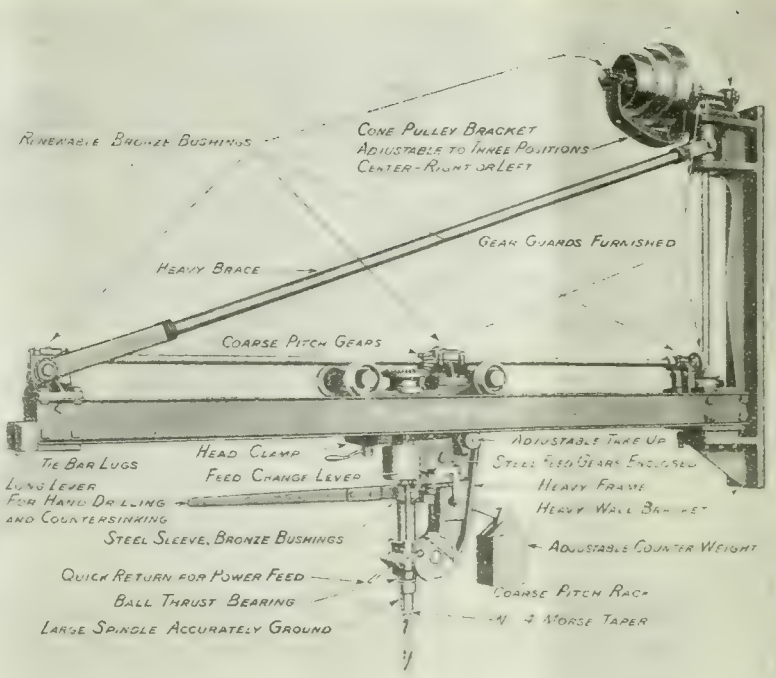
Here's a Drill You Want

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end to the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

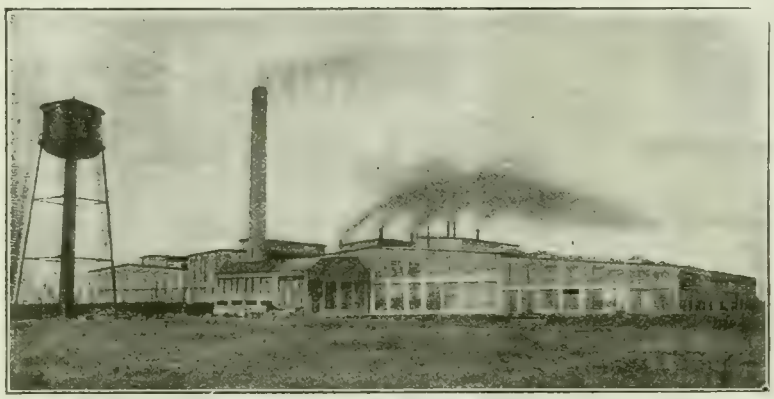
Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**



STAINLESS STEEL

FOR CUTLERY PURPOSES

Prices On Application

Armstrong, Whitworth of Canada, Limited

HEAD OFFICE
298-300 ST. JAMES ST., MONTREAL
WORKS
LONGUEUIL, QUE.
BRANCHES
DOMINION BANK BLDG., TORONTO
27 KING WILLIAM ST., HAMILTON
McARTHUR BUILDING, WINNIPEG

IMPERIAL GENUINE BABBITT METAL

The Highest Grade Manufactured

Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal Winnipeg Vancouver

Don't Let Your Men Work with Dull Files

Tell them to turn them in when they have passed their "efficient point."

By doing so you will get more and better work from the men. You will save money because labor is more costly than material and your men will be better satisfied because no man likes to work with poor tools.

The files that give the longest efficiency are the "Famous Five."

Specify Them When Ordering.
They Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

Immediate Service In Williams' Superior Drop-Forged Wrenches

For Every Purpose

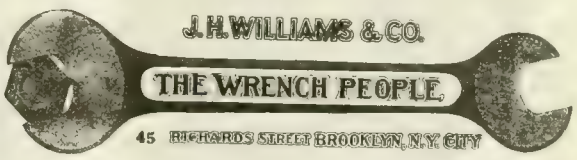
PURSUANT to our policy, inaugurated nearly half a century ago, of standardizing lines of Drop-Forged Wrenches, we have now developed some 40 patterns in about 1,000 sizes with openings running from 3/16 to 7⅝ inches, for every purpose.

All are reliable, efficient tools made of the best materials obtainable and manufactured by methods developed and perfected through many years' experience.

We carry them Big and Little, Bent and Straight, Thick and Thin; something *Standard* for every recognized trade need.

Specify "Williams' Wrenches" or Tools when you order and get *Superior* quality.

Ask for Wrench Booklet



The A. G. Low Co. Ltd.
45 Pacific Ave. Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta, and British Columbia

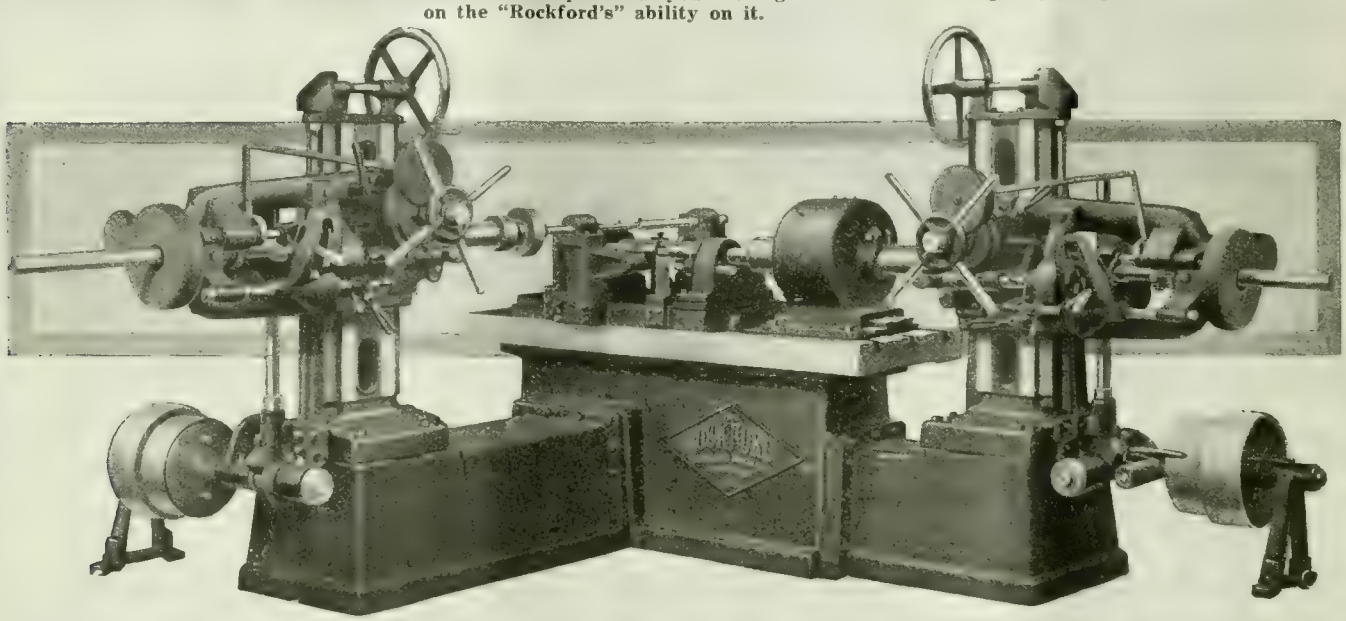
If any advertisement interests you, tear it out now and place with letters to be answered.

Rockford Horizontal Boring Machine

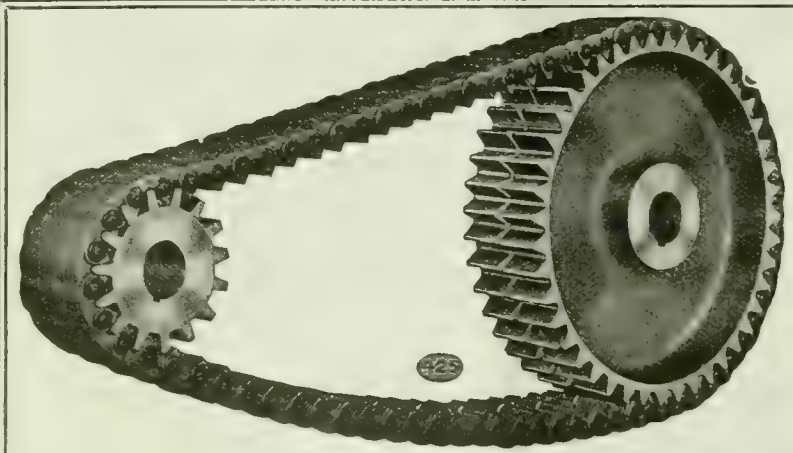
For Automobile Manufacture

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.



Jones & Glassco (Reg'd)

ENGINEERS

MONTREAL AND TORONTO

Specialists in

POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

"RENOLD"

Patent Silent and Bush Roller Chains

"MORSE"

Rocker Joint Silent Chains

Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

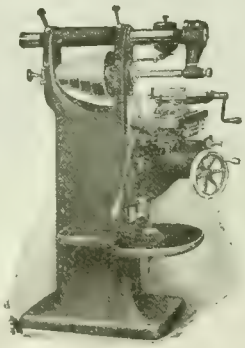
Write for particulars to

Head Office: St. Nicholas Building MONTREAL

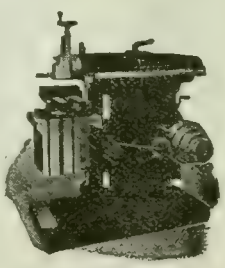
Branch Office: 1204 Traders Bank Building TORONTO

Increased Production Means Increased Profits

Large Millers for large work —STEPTOE MILLERS for small work



Large Planers for large work —STEPTOE SHAPERS for small work.

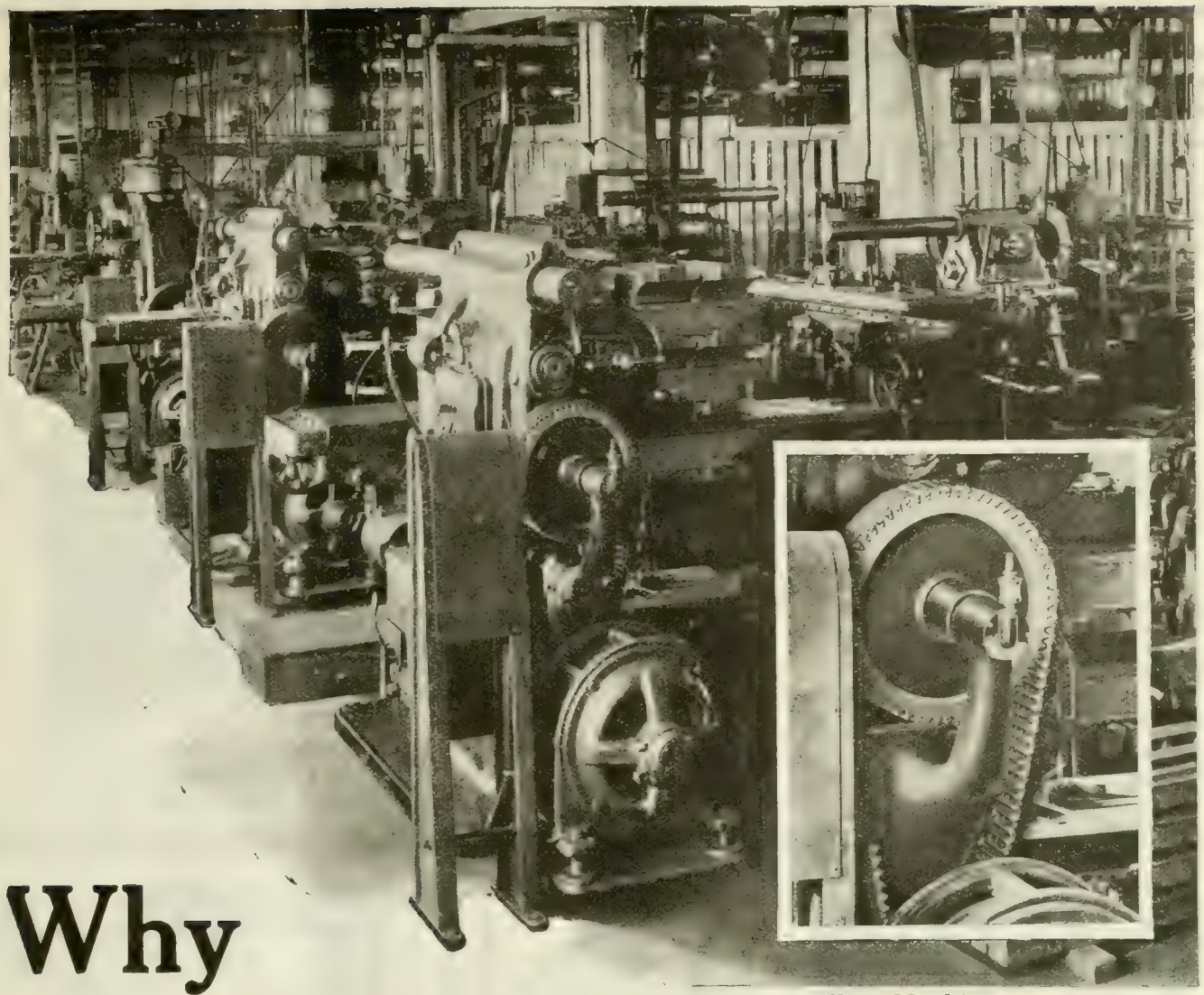


Will result in increased production; less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY

CUMMINSVILLE, CINCINNATI, OHIO, U.S.A

Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.



Group of Milling Machines

Why Do Modern Shops Use "Morse"?

Machine Tools driven through "Morse" Silent Chains are positively connected to motor—instantaneous motion, no slip, no backlash. 99 per cent. efficient, compact, flexible, positive.

"MORSE" Drives have every quality of

Efficient Power Transmission

STRENGTH SIMPLICITY ENDURANCE SILENCE

Conserve Power *Before Buying Pulleys and Belting investigate, know the facts.* **Increase Production**

Are you under your conditions producing maximum output with minimum cost?

MORSE CHAIN CO.

Largest Manufacturers of Silent Chains in the World

ITHACA, N.Y.

MORSE ENGINEERING SERVICE ASSISTANCE WITHOUT OBLIGATION

Address Nearest Office

BOSTON, Mass. . . . . 141 Milk Street
CHICAGO, Ill. . . . . Merchants Loan & Trust Bldg.
CLEVELAND, Ohio . . . . . 421 Engineers Bldg.
DETROIT, Mich. . . . . 1003 Woodward Ave.
GREENSBORO, N.C. . . . . 805 Ashboro Street
NEW YORK CITY . . . . . 50 Church St.
PITTSBURGH, Pa. . . . . Westinghouse Bldg.
SAN FRANCISCO, Cal. . . . . Monadnock Bldg
ATLANTA, Ga. . . . . Earl F. Scott, M.E., 702 Chandler Bldg
CANADA . . . . . Jones & Glassco, Reg'd Montreal, St. Nicholas Bldg. Toronto, Traders' Bank Building
MINNEAPOLIS, Minn. . . . . Strong-Scott Mfg. Co. 413 Third St., S.
ST. LOUIS, Mo. . . . . Morse Engineering Co., Chemical Bldg
Licensees for Europe and Eastern Hemisphere, The Westinghouse Brake Co., Ltd., 82 York Road King's Cross, London, N

If any advertisement interests you, tear it out now and place with letters to be answered.

Smalley General Thread Milling Machines

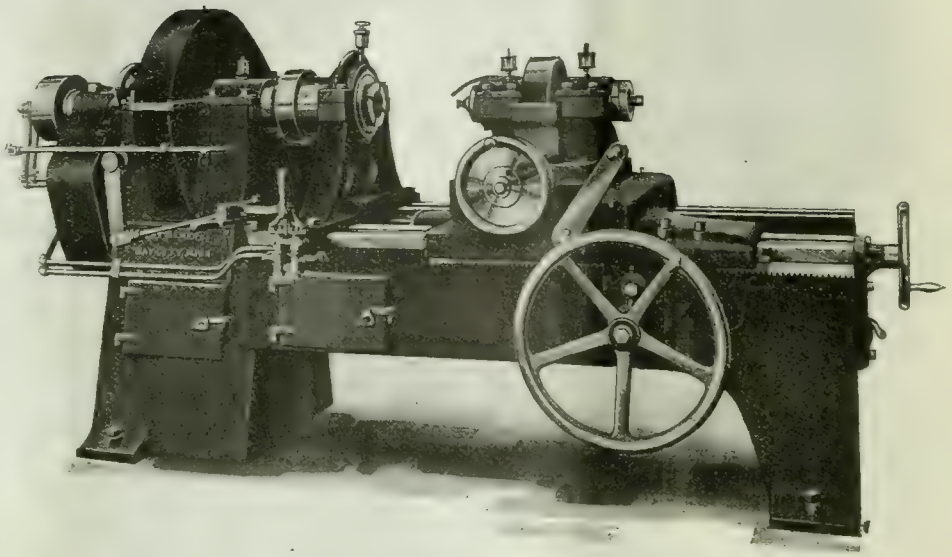
Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.



Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

SIDNEY

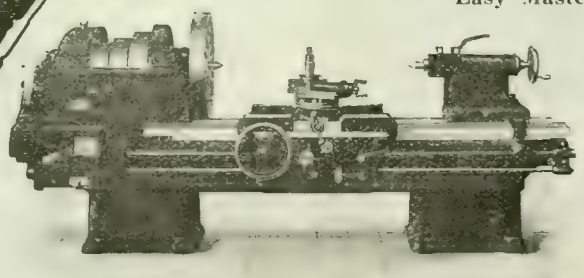
Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

Easy Masters of Big Jobs

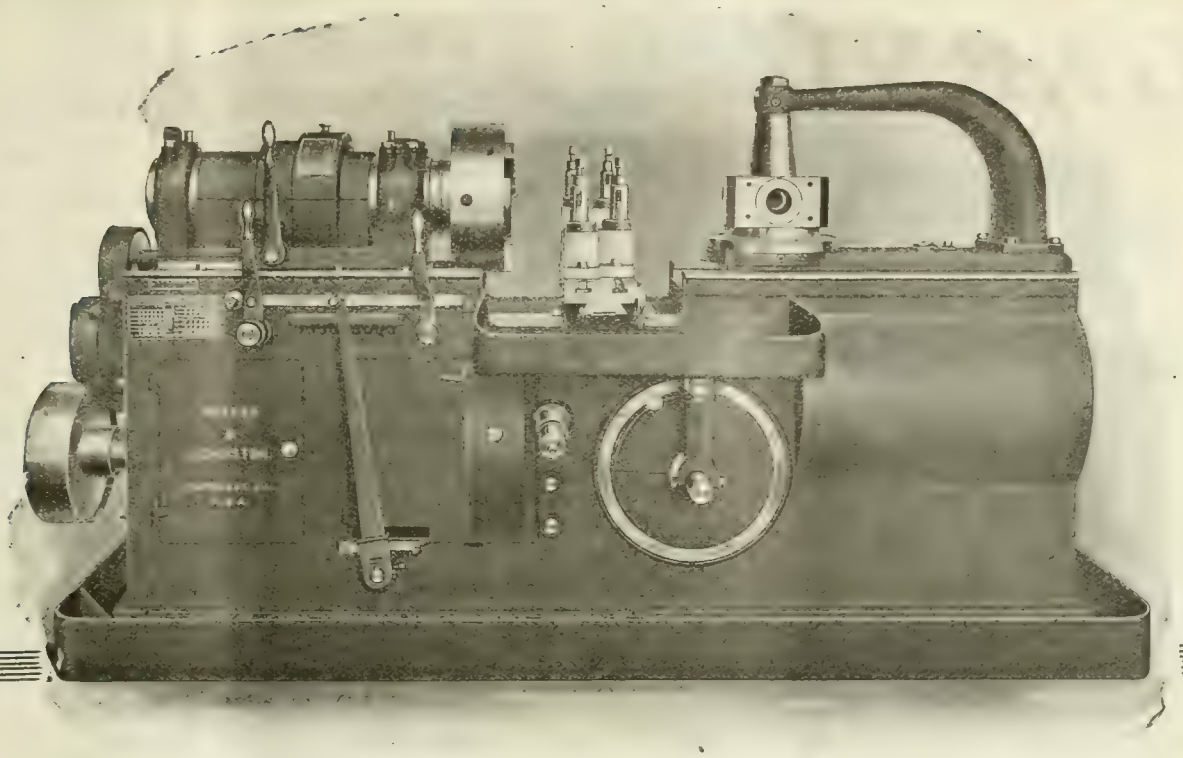
Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletins just issued on 25-inch machine. Write to-day!

For SERVICE



The Sidney Tool Company
SIDNEY, OHIO

CANADIAN AGENTS:
The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

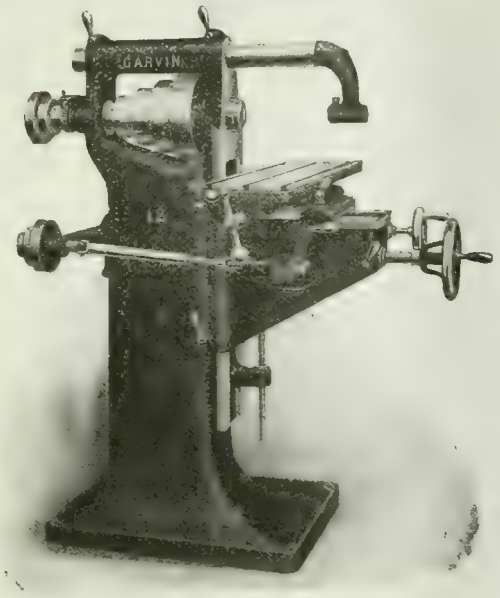
Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

GARVIN



No. 12 Plain Milling Machine - Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

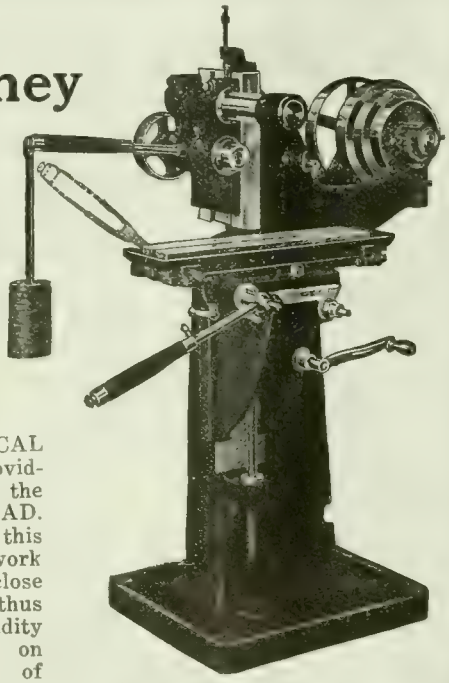
THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

THOUSANDS IN USE

The Whitney

Hand Milling Machine



The VERTICAL FEED is provided for by the SLIDING HEAD. On account of this feature the work can be held close to the table, thus giving a rigidity not possible on other types of Hand Millers.

Send for Catalogue A.

The Whitney Mfg. Co.

Hartford Conn. U.S.A.

Chains Keys Hand Milling Machines

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

STELLITE

"Not Steel but its Master"

Reconstruction Period

The part played by STELLITE in the winning of the war has been no small one. It was due to the use of STELLITE and the determination of our manufacturers that Canada was able to make such an enviable record in shell production.

What Canada has done in war she can do in peace, but she must continue along the lines of rapid production and efficiency.

By the use of Arc-Welded Tools of STELLITE your production can be increased and your tooling costs reduced.

Write Our Service Department For Particulars

Deloro Smelting & Refining Company, Limited

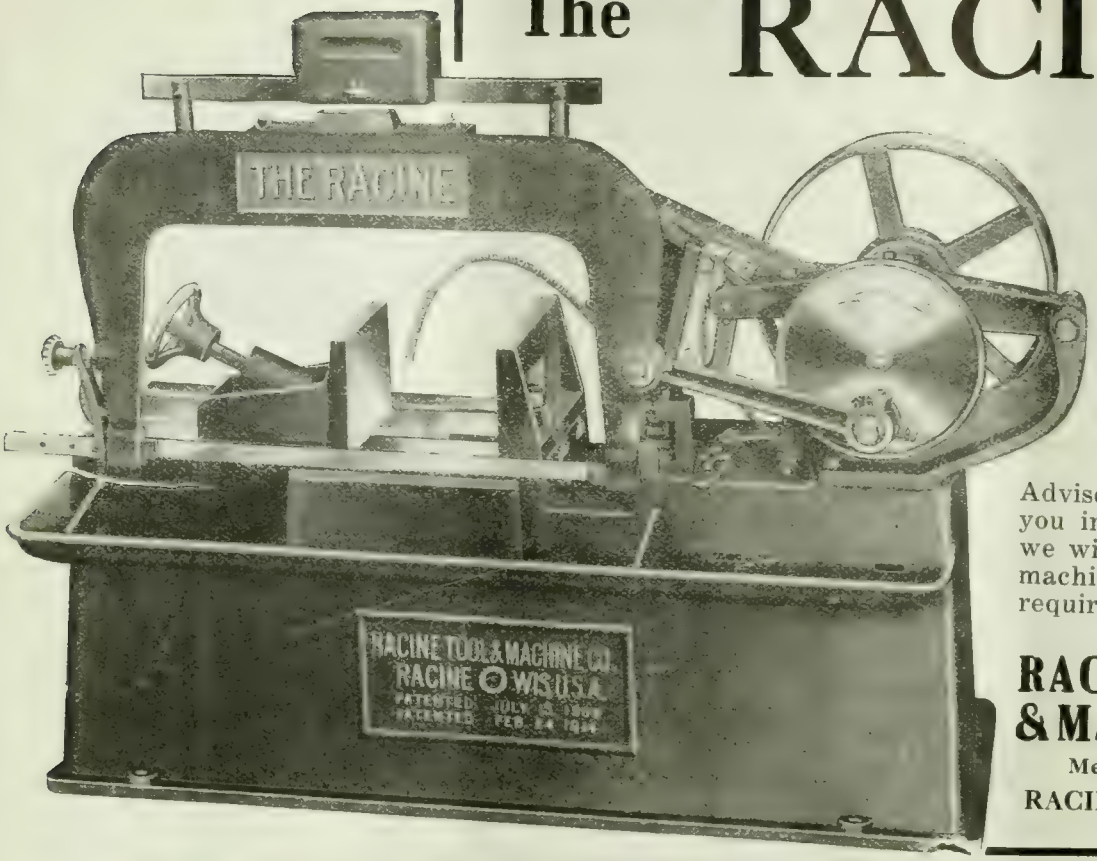
TORONTO
200 King Street West

DELORO, ONT.

MONTREAL
315 Craig Street West

If any advertisement interests you, tear it out now and place with letters to be answered.

The "RACINE"



For Speed

For Accuracy

For Quantity Production

For Saving in Blade Costs

For Saving in Material

Advise us the size stock you intend cutting and we will quote you on a machine suited to your requirements.

RACINE TOOL & MACHINE CO.

Melbourne Avenue

RACINE, WIS., U.S.A.

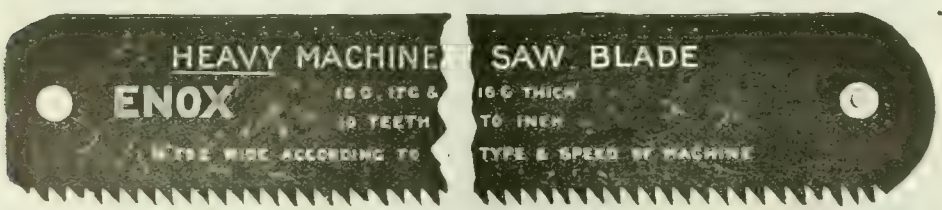
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

ST. JOHN MONTREAL VANCOUVER



ENOX

Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

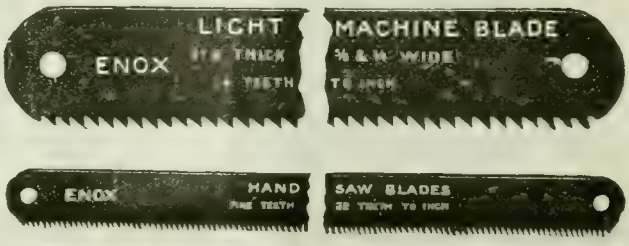
Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

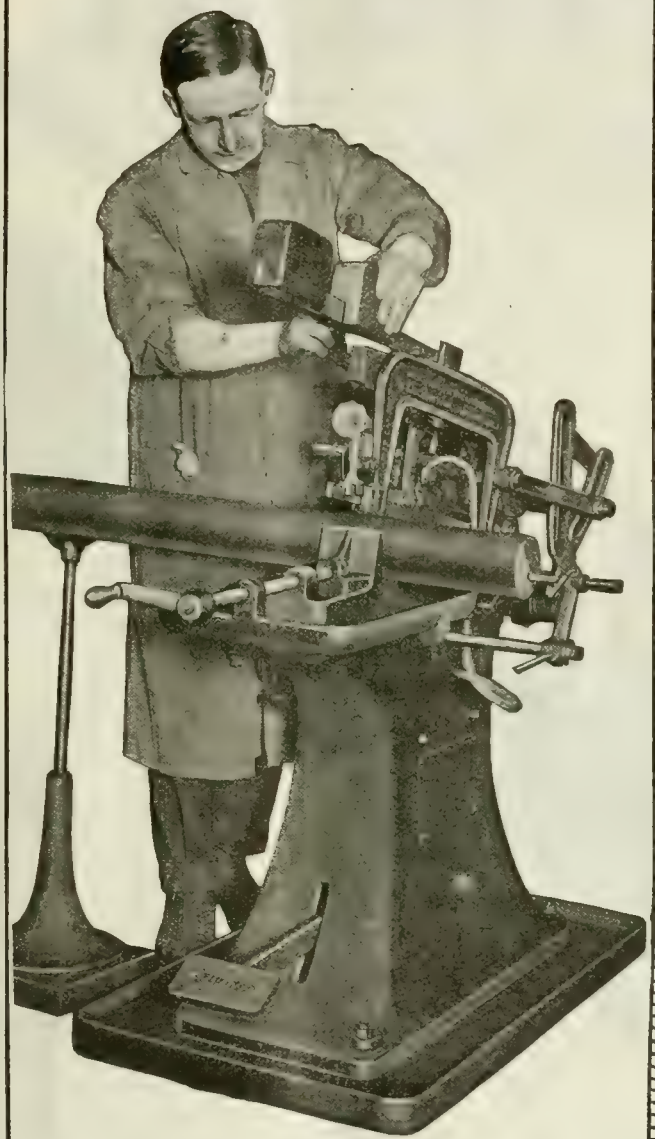
Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10





You Save Raw Materials—

like coal, iron, cotton, steel, etc. Why not hack saws and TIME, which is so vital in industries to-day? For the utmost in hack saw value—the maximum of cost, use

STARRETT Hack Saws

They help "speed up" production, because they cut faster and are economical, because they last longer.
Write for Catalog No. 213. It shows hack saws and frames, also in any styles and sizes of Starrett Precision Tools.

The L. S. Starrett Co.

The World's Greatest Toolmakers.
Mfrs. of Hack Saws Unexcelled.
ATHOL, MASS.

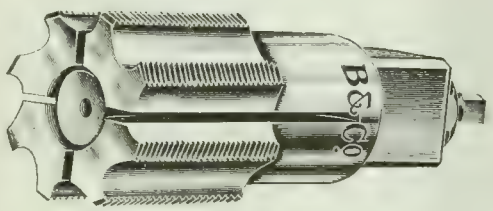
STARRETT HACK SAWS CUT QUICKER LAST LONGER

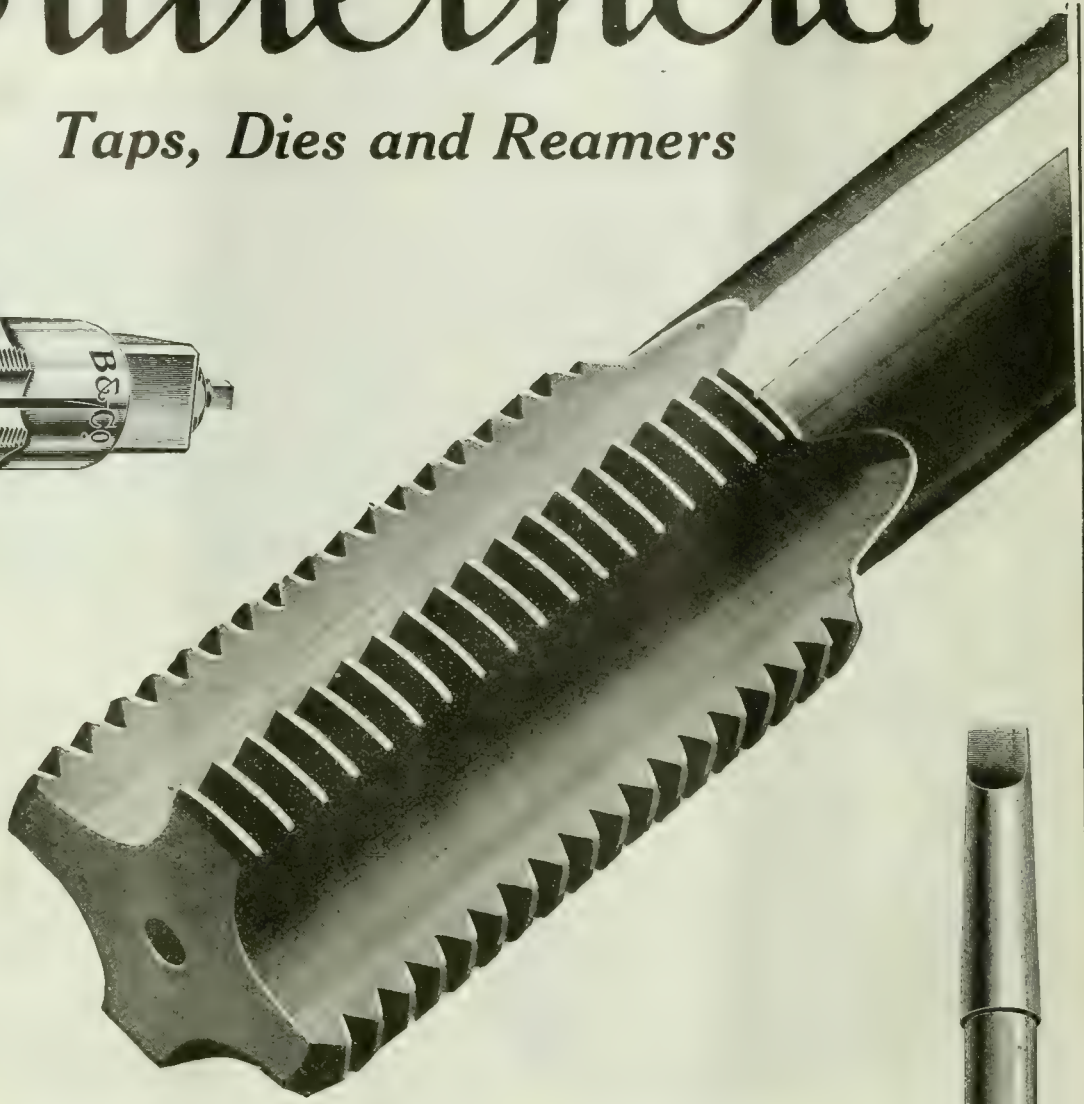
42-866

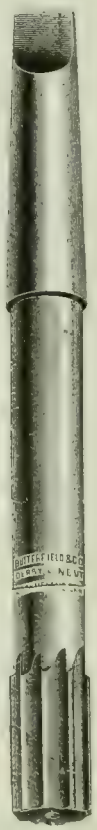
Starrett Hack Saws

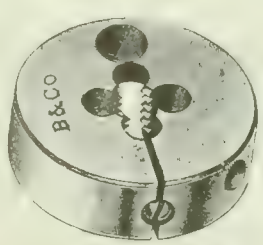
Butterfield

Taps, Dies and Reamers









The Deciding Factor in Tool Economy is Quality

Every process in the manufacture of Butterfield Tools is performed by experts, whose entire aim is to produce the highest quality—and the rigid inspection prevents any possibility of inferior tools reaching the shipping room.

By the service afforded—by the ability to cut cleanly and accurately and to duplicate the work over a long period of use—Butterfield quality gives the maximum returns on your investment.

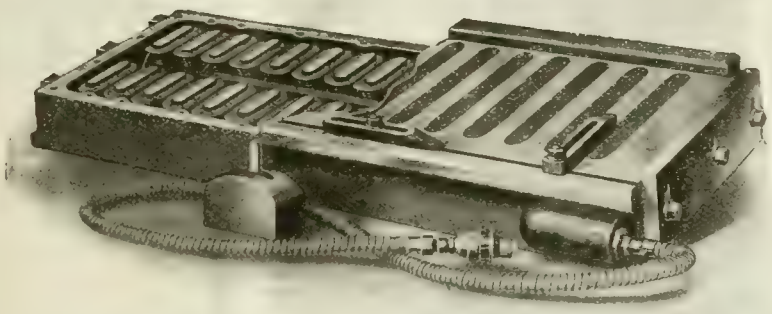
Butterfield Tools reflect splendidly our 35 years' continuous concentration on improvement in high speed tools. You can't go wrong with a Butterfield.

Send for Catalog No. 17. It's just out

Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office : 220 King St. W.

14 FACTS ABOUT HEALD MAGNETIC CHUCKS



Holding Power is 110 to 210 lbs. per sq. in., depending on size of chuck.

Pole Pieces do not loosen up. Top Plate Frame is solid.

Plenty of air space between coils.

Unit Coil System means uniform holding power over entire magnetic surface.

Great Range of Work due to pole arrangement.

Very Thick Top Plate allows surface to be trued up frequently.

Chuck is Water-proof, Moisture-proof and Heat-proof.

Small Current consumed.

Water-tight Volt Box. Voltage easily changed on rectangular chucks.

Heald Chucks will not magnetize machine they are used on.

Armor Tube protects connecting wires.

Detached and Protected Demagnetizing Switch, can be located at operator's convenience.

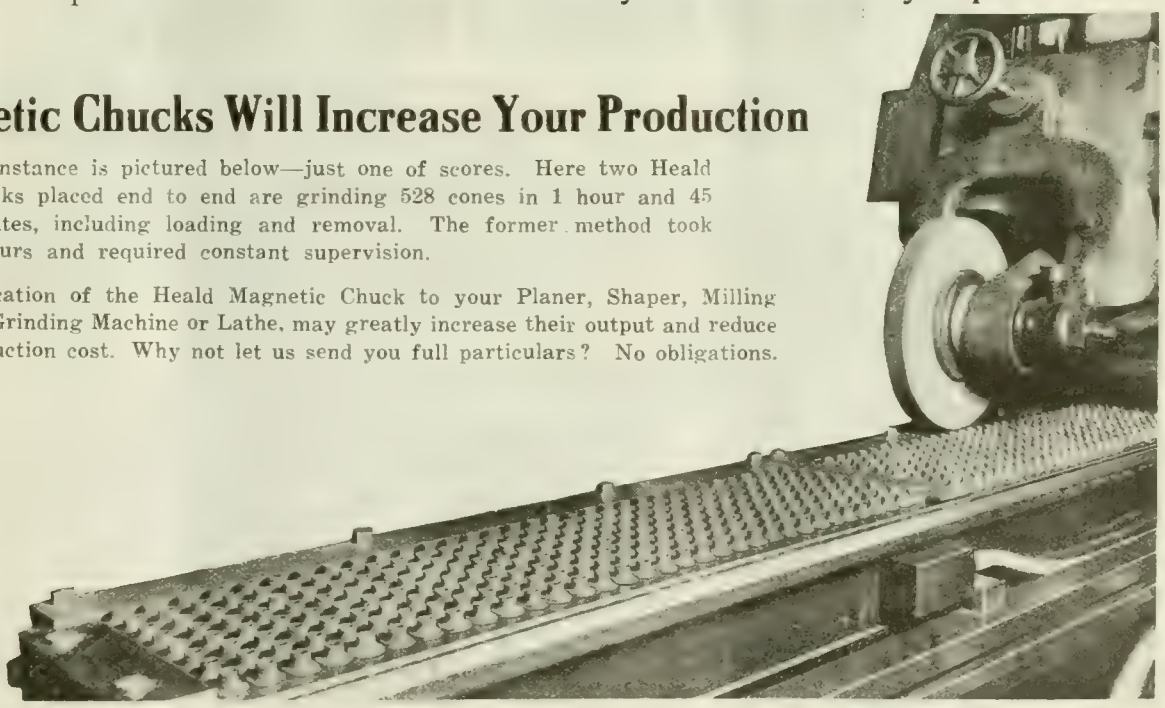
Chuck Demagnetizes completely.

Every Feature Tested by Experience.

Magnetic Chucks Will Increase Your Production

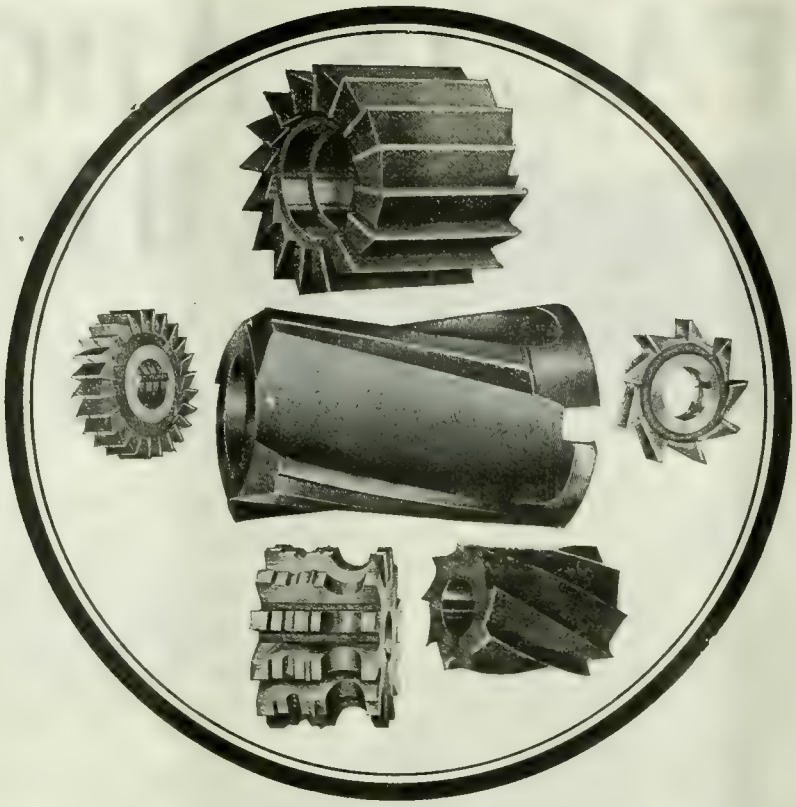
An instance is pictured below—just one of scores. Here two Heald Chucks placed end to end are grinding 528 cones in 1 hour and 45 minutes, including loading and removal. The former method took 5 hours and required constant supervision.

The application of the Heald Magnetic Chuck to your Planer, Shaper, Milling Machine, Grinding Machine or Lathe, may greatly increase their output and reduce your production cost. Why not let us send you full particulars? No obligations.



The Heald Machine Co., Worcester, Massachusetts

CANADIAN AGENTS:—Aikenhead Hardware, Ltd., Toronto; Canadian Fairbanks-Morse Co., Montreal; George F. Foss Machinery & Supplies Co., Montreal; Garlock-Walker Machinery Co., Toronto; H. W. Petrie, Ltd., Montreal, Quebec; Standard Machinery & Supplies, Ltd., Montreal; The Swedish Gauge Company, Montreal; A. R. Williams Machinery Co., Ltd., Toronto; Williams & Wilson, Montreal, Quebec.



DAVIDSONIZED
HIGH SPEED STEEL TOOLS

such as pictured above, are establishing new standards in high speed tool efficiency. Made by the Davidson process, these tools possess a degree of toughness, cutting efficiency and resistance to abrasion such as was never before believed possible. Actual working tests have always proven 50% or greater increase in production.

SPECIAL SERVICE

To plants having their own tool making force we supply these tools in rough ground annealed form within approximately 1-32 of finish. Thus a tool that takes 20 hours to make from the solid bar can easily be finished from our blanks in 2 hours. This standard of comparison holds good as regards various styles and sizes of tools. The use of our tools in this form will establish new standards in tool room production. We guarantee against breakage in the hardening operation.

Send Drawings, Blueprints or Patterns and we will quote prices and quick deliveries.

DAVIDSONIZED D T M CORP. STEEL

The Davidson Tool Mfg. Corporation

Main Offices:
118-120-122-124 Maiden Lane
New York City

Works:
56-58-60-62 North Sixth Street
Brooklyn, N.Y.

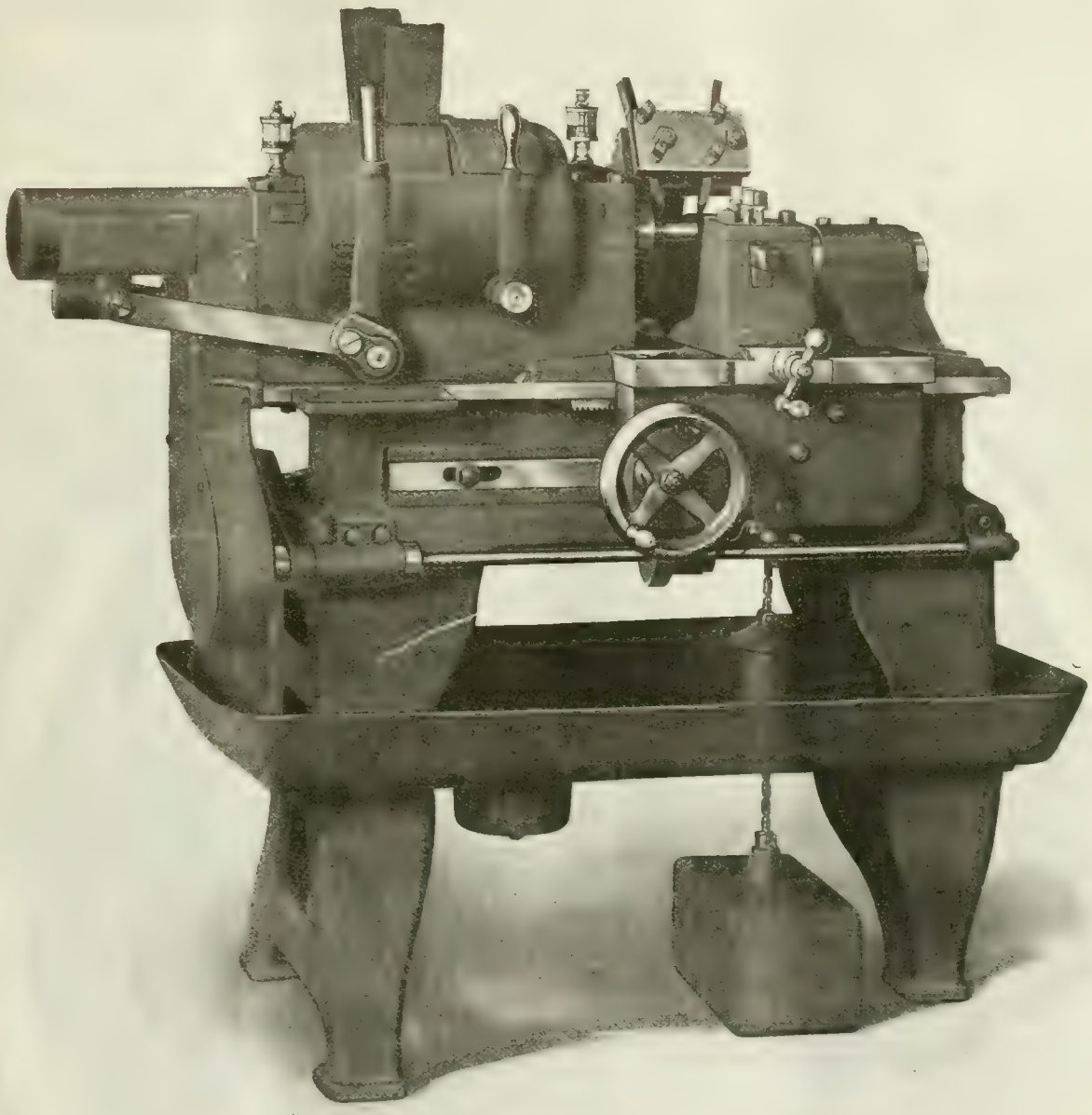
SOLE SELLING AGENTS FOR CANADA:

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Ottawa Toronto Winnipeg Hamilton Saskatoon St. John Calgary Quebec Vancouver Montreal Victoria Windsor

REED-PRENTICE COMPANY

WORCESTER MASS. U.S.A.



DO YOU KNOW?

A REED-PRENTICE AUTOMATIC WILL MACHINE BUSHINGS AND SIMILAR PIECES WHICH CALL FOR TURNING, FACING, GROOVING OR BEVELING, IN COMBINATION, WITH A RAPIDITY THAT WILL MAKE YOUR PRESENT PRODUCTION TIME UNWORTHY OF FURTHER CONSIDERATION.

IF YOU HAVE QUANTITY MANUFACTURE OF SUCH A CHARACTER, SEND US A BLUE PRINT OF THE PIECES AND WE WILL GLADLY SEND YOU GUARANTEED TIME FIGURES WHEN THE MACHINING IS DONE ON A REED-PRENTICE AUTOMATIC LATHE.

CANADIAN FAIRBANKS-MORSE CO., LTD.
MANNING, MAXWELL & MOORE, INC.
FENWICK FRERES.

Through SKF Ball Bearings

60 to 80% of your friction load is wiped out. 80% of your lubricant is saved. Hot boxes, burnouts, binding, seizing are eliminated. All this through S K F Ball Bearings. Whether in your line shafting, your machine tools, or in fact any mechanism that consumes power, S K F Ball Bearings will reduce friction and upkeep cost to a minimum.

Special literature on many subjects will interest and convince you.

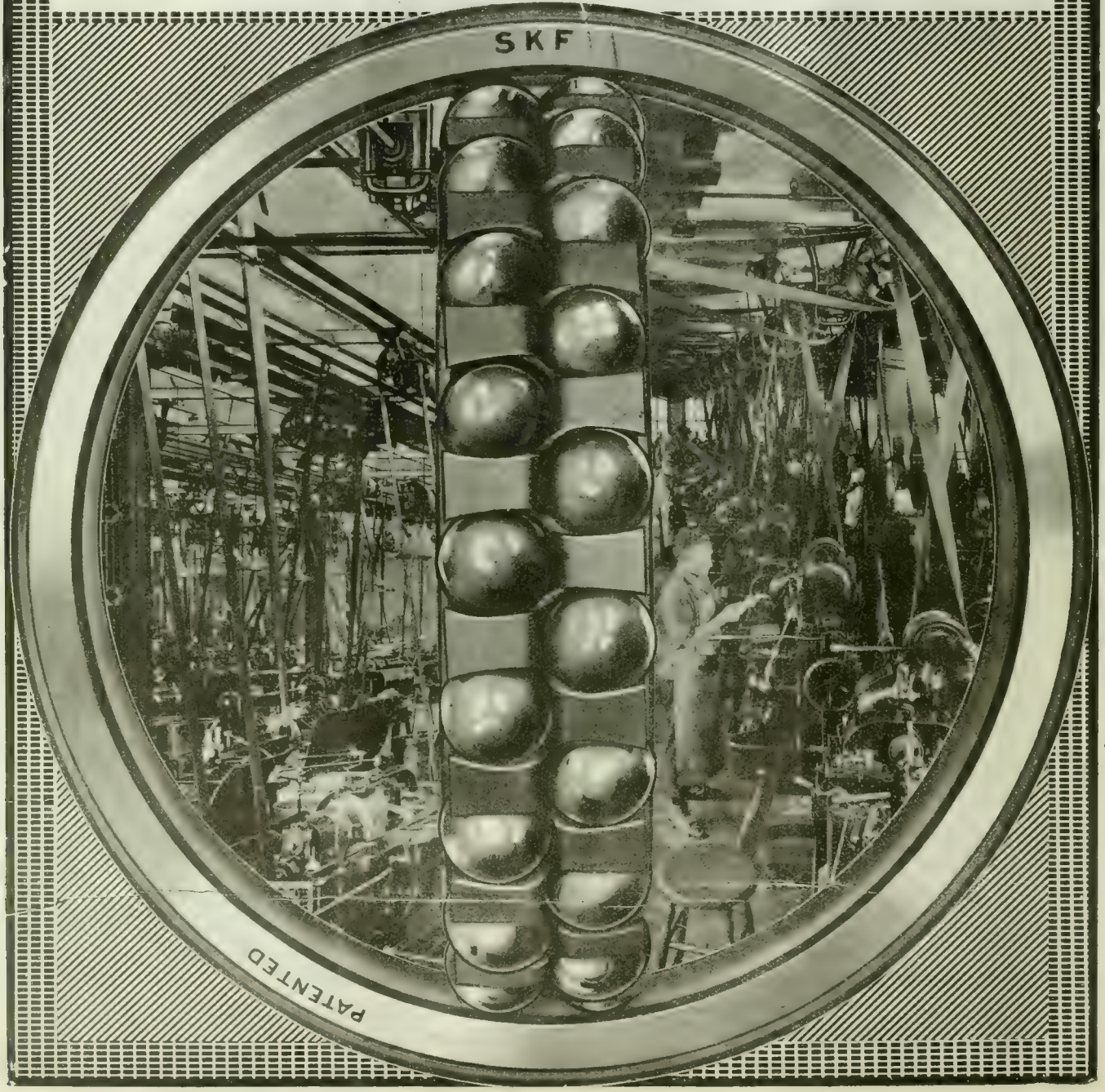
CANADIAN SKF COMPANY
LIMITED

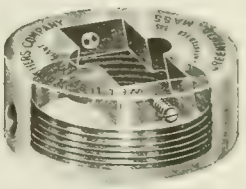
TORONTO, ONT. 128 Coristine Building, Montreal, Quebec

Agents for SKF Transmission Bearings:

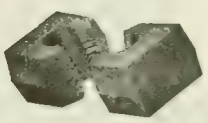
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Vancouver Calgary Victoria

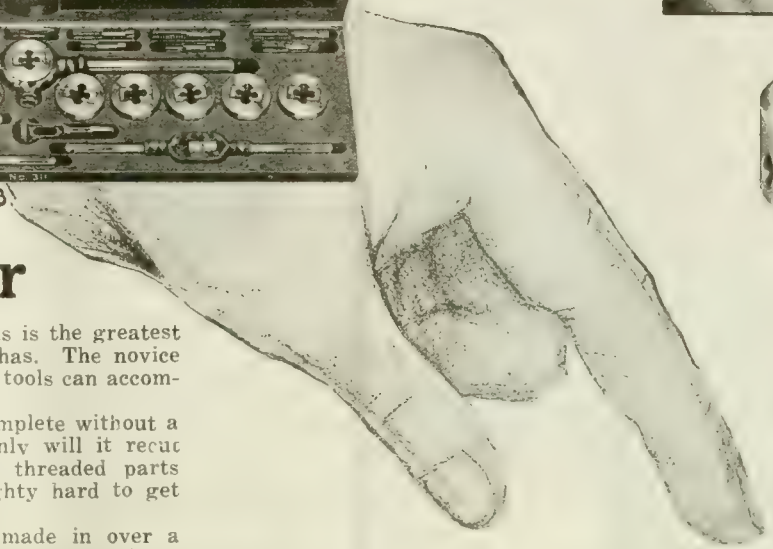




Cap for Little Giant Collet, showing Adjusting Screws.



Little Giant Die



A Pointer

Poor tools or lack of tools is the greatest hindrance the repair man has. The novice with an assortment of good tools can accomplish more.

No shop equipment is complete without a GTD Screw Plate. Not only will it recut jammed threads, but new threaded parts can be made—and it's mighty hard to get spare parts nowadays.

GTD Screw Plates are made in over a hundred assortments. Yours is among them.

Write for New Small Tools Catalog No. 40 describing Screw Plates, Taps, Dies, Reamers, etc.

WELLS BROTHERS COMPANY of Canada, Ltd.
GALT - ONTARIO
Canadian Factory of the
GREENFIELD TAP AND DIE CORPORATION

Buy a

G T D Screw Plate

with Little Giant Adjustable Reversible Dies

Forgings and Steel Stampings

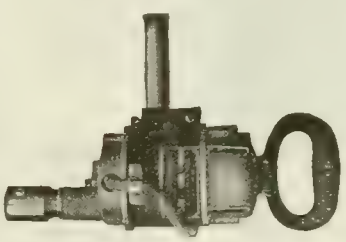
OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

Dominion Forge & Stamping Co., Ltd.
WALKERVILLE, ONTARIO
Toronto Office: 510 Lumsden Building

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

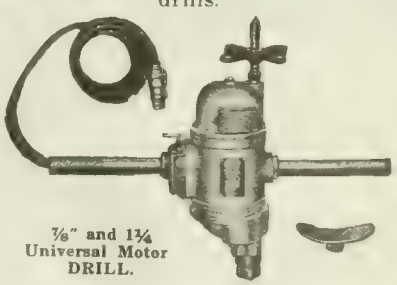
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅞" and 1¼ Universal Motor DRILL.

For Sale By

The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

Notes on Grinding
NORTON COMPANY, WORCESTER, MASS.
No. 21A

The Use of Hard Wheels

Log conditions vary with the seasons. In the winter the logs are frozen or ice-covered; in the spring the bark is full of dirt, mud and grit, which cannot be entirely removed by flushing with a hose or rolling around in the pond. All the year trouble is usually experienced from iron in the form of nails, spikes and bolts which have been driven into the logs at various times. Stones are frequently picked up in the bark and completely covered over in a few years.

When a saw runs into iron or stones, anything is likely to happen, from the mere dulling of the points of the teeth to completely stripping away the teeth and perhaps tearing the whole saw to pieces. The amount of grinding is necessarily proportional to the condition in which the saws came back to the file room. With knocked-off points and stripped teeth, several hours of exceedingly hard grinding may be necessary. This is hard on the wheel, which may wear down in a few hours of this strenuous work as much as several weeks of ordinary grinding. For an occasion like this the careful grinder uses the wheels which he has found are too hard for the general run of work. These harder wheels will stand up and hold their shape much better than can be expected of the regular wheels.

As you were reading the above, perhaps some grinding problem in connection with your saw sharpening occurred to you. The Norton Sales Engineering Department stands ready to help you solve this problem. Why not put it up to them?

NORTON COMPANY

NEW YORK STORE 151 CHAMBERS ST. — CHICAGO STORE 11 NO. JEFFERSON ST.

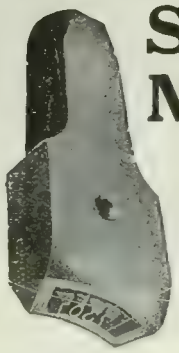
ELECTRIC FURNACE PLANTS
NIAGARA FALLS, N.Y. — CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS N.Y. CHIPPAWA, ONT. — NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO. JEFFERSON ST.

NORTON



Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.
Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.
Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

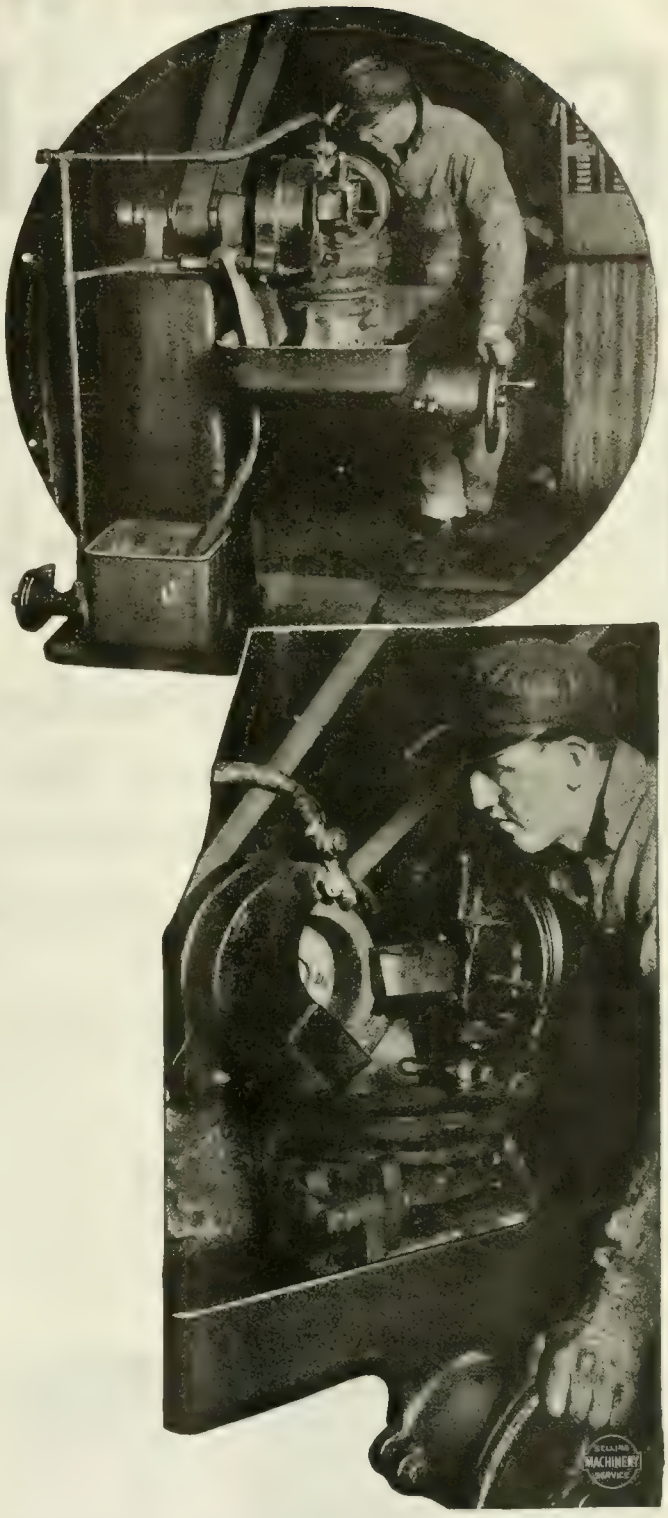
Metalwood Manufacturing Co.
Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

SAVED!

—$7.50 Annually on Every Machine Hand in the Shop



that is operating an engine lathe, turret lathe, shaper, planer, slotter, vertical boring-mill or screw machine.

Let's say that every one of these machinists consumes five minutes a day grinding tools. As a matter of fact they all probably consume more. But five minutes is a fair, conservative estimate to use as a basis for some rapid calculating.

Now let's say you are paying 30 cents an hour and working 300 days a year.

If your men could be relieved of tool grinding you would get **25 hours more** production time from each one annually, with no additional hardship to him—and you'd save $7.50 per man. Worth considering, isn't it?

And your men *can* be relieved of tool grinding! That's the point. You can easily make this saving.

A boy or a handy man can do all of the tool grinding for your entire plant—and do it right—better even than your best machinists can do it by hand—if you install in your tool room a

GISHOLT TOOL GRINDER

Send us your name and address and let us tell you more about the Gisholt Tool Grinder.

Gisholt Machine Company, Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents : The Canadia n Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

THE CANADIAN
Fairbanks-Morse
EVERYTHING MECHANICAL

Fairbanks Scales

The World's Standard for over 90 years---
The Scales that made weighing
accurate---For every weighing
requirement.

Engines Pumps

Machinery Supplies

Our stocks are the largest in Canada

The Canadian Fairbanks-Morse Co., Limited

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton
Windsor Winnipeg Saskatoon Calgary Vancouver Victoria

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 3. January 16, 1919.

Making Milling and Gear Cutting Attachment—I

In This Article is Described the Making of an Attachment For Lathes Which Performs Milling and Gear Cutting Operations—Various Tools and Operations Used in Machining Are Shown

By ROBERT MAWSON

IN this article is described an attachment for lathes which performs milling and gear-cutting operations.

The attachment is compact, easily applied and positive in its action.

The various tools used in machining the various elements are described in detail also by means of illustrations.

It will be seen that they are of a high character as regards modern tool design and manufacture enabling accurate and intensive production to be obtained.

In most cases the first machine tool bought by a shop is a lathe.

A visit to the small country jobbing shop will show in many cases as the only machine tool—a lathe, or as the shop enlarges, two or more to meet the demand.

However, there are many problems which come to both the small and larger shops that cannot be well done on a lathe. Such problems are milling and gear-cutting, and as these are so few that they do not warrant the purchasing of a special machine, an attachment for the lathe which will perform these operations is useful and valuable.

The Presto Machine Co., Inc., Brooklyn, N.Y., are manufacturing what is known as the "Star" milling and gear-cutting attachment, which is designed and can be used to advantage for the work noted.

In Fig. 1 is shown a front view of the attachment fitted onto a lathe, and a rear view is illustrated in Fig. 2.

The attachment can be conveniently secured to the lathe and is suitable for a wide range of work, which includes various milling operations with the exception of spiral cuts.

The cutter block A is mounted on the carriage of the lathe and fed in either direction, longitudinal or cross, by hand or automatic power feed of the lathe.

The cutter spindle B may be rotated in either direction, receiving power from the driving collar C, which is clamped on the spindle of the lathe.

Motion is transmitted through the sliding shaft, universal joints shown and bevel gears in the cutter block.

The universal head D is clamped to the inside ways of the lathe bed. The vertical column E carries a slide, on which may be mounted the dividing head as shown, or a vee; a graduated collar on feed screws reads in thousandths of an inch.

The vertical column swivels on base and the dividing head swivels on the vertical slide, graduations of 180 deg., facilitate quick and accurate adjustment to any desired angle.

The index arm swings on end of bearing for indexing spindle, is graduated and may be adjusted for side cuts on bevel gears. When the vise is used on the vertical column work such as surface milling, cutting keyways, milling ends of shafts may be performed.

Machining the Cutter Block

One of the most complicated castings on the attachment is the cutter block, and is shown in detail in Fig. 3.

The problem of tooling this part so that accurate and intensive manufacture could be obtained was also quite a study. One of the rough castings as received at the shop is shown in Fig. 4.

The first operation is rough planing the vees, which is performed in a fixture which holds 14 at once in two rows of seven. The next operation is finish machining the vees and is performed with the fixture shown in Fig. 5.

The casting is located on three pins as A and held down with two straps B.

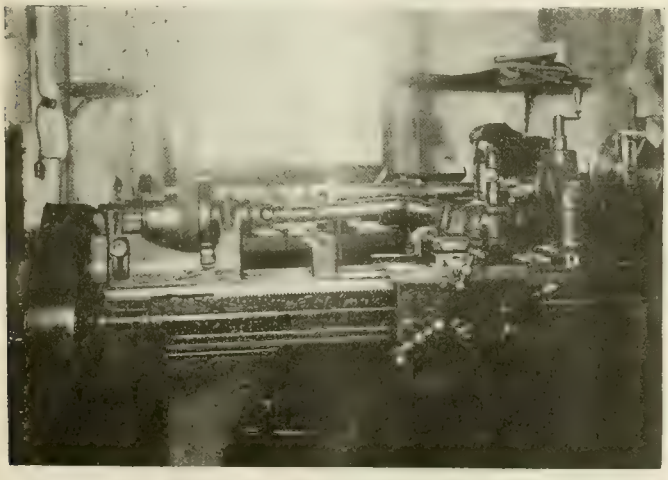


FIG. 1. FRONT VIEW OF ATTACHMENT IN USE.

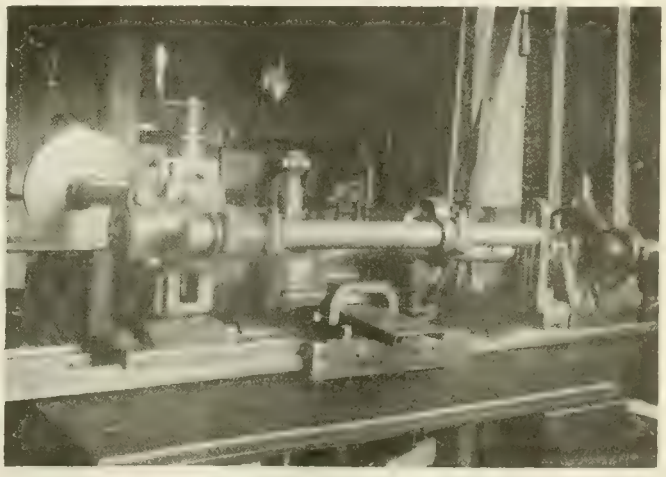


FIG. 2. REAR VIEW OF ATTACHMENT ON LATHE

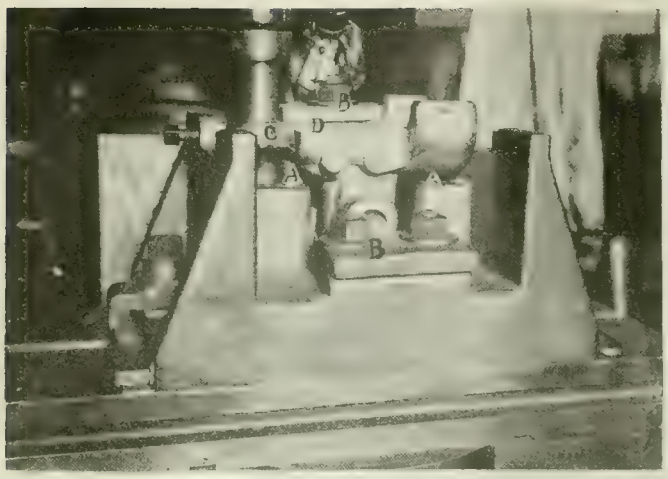


FIG. 2. FINISH MACHINING THE VEES.

FIG. 1.—UNFINISHED CUTTER BLOCK.

The correct location is obtained with a stop pin. It will be noticed that the strap in front fits into the cored hole of the piece which affords a handy and sure means of holding.

The milling fixture is located by tongues on the machine table so that the milled slot will be square.

The vees are then machined with the angle cutter C.

The machine table is then lowered, the correct amount reading with the index of the miller in the usual manner, and the upper surfaces D machined with the end of the same angle cutter. The vees are then scraped accurately to a gauge after the casting has been removed from the fixture.

The casting is then placed in the jig shown in Fig. 6 and the angular hole drilled and reamed to 1.250 inches.

In the jig the casting is located by the steel vee block A, the piece being slid in from the end. This block accurately fits the scraped surfaces and the casting is then pushed back against a stop pin.

The screw B, when tightened, holds the piece securely in the jig.

Some idea of the number and sizes of holes machined in this and the subsequent operation using this jig may be gathered by referring to the tool board shown at the right of the jig.

An interesting method is the way these are arranged in the tray or board, which is the sequence in which the man uses them, and being kept in order as shown, facilitates the machining operation.

The jig is then turned over on the other three sides and all the other holes, with the exception of the bolt holes, are then machined.

These operations comprise drilling, reaming, counterboring and facing bosses. These may be followed by referring to the detail of the cutter block. The bolt holes are next drilled and tapped, no jig being used, the holes being spotted in the centre of their respective bosses.

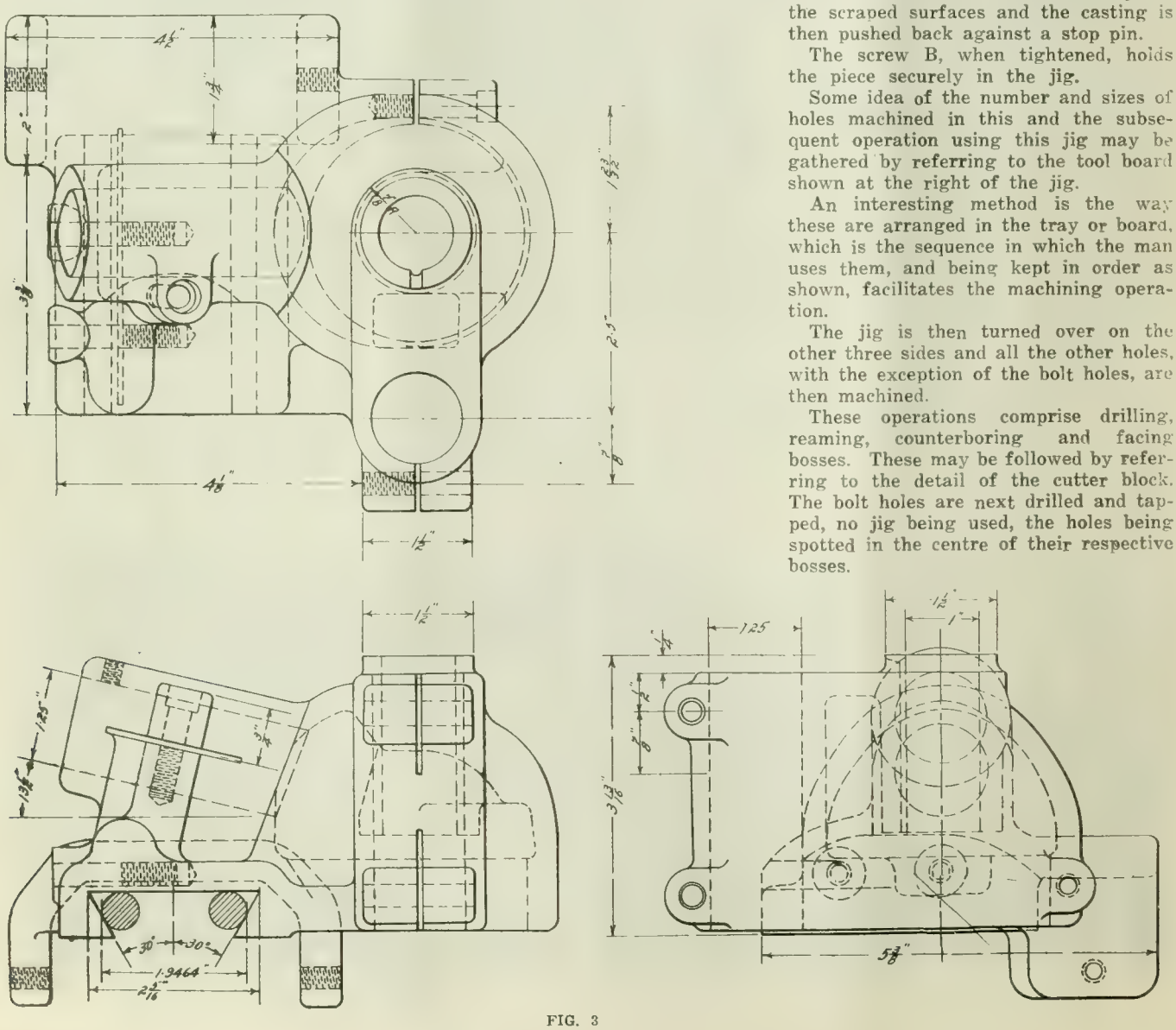


FIG. 3

The casting is next placed on the fixture, Fig. 7, being located by 1-in. and 1.250-in. pins which fit into holes A and B respectively.

Two slots are then cut at C and D, using a 1-16-in. slitting cutter in the milling machine in the usual manner. The casting is then removed from the fixture and an oil groove cut in each bearing.

One of the finish machined cutter blocks is shown in Fig. 8 and an idea of the amount and variety of machining operations necessary is apparent.

Machining Cutter Block

The cutter block is made from bar steel, and the first operation is cutting to length.

One of the sections is then placed in the fixture, Fig. 9, being located against the two setscrews A.

The open-ended strap B is then tightened onto it by means of the setscrew, as shown with the fixture in position on the milling machine table. A pair of gang cutters with a cutting edge of 60 deg. to obtain 30 deg. on the block, accurately spaced, is used to machine the piece.

The block is then placed in the jig, Fig. 10, being pushed into a locating vee surface at the rear with the screw A and at the forward end with the setscrew B.

The two setscrews C are then tightened down to hold it securely in the jig.

(Continued on page 63)

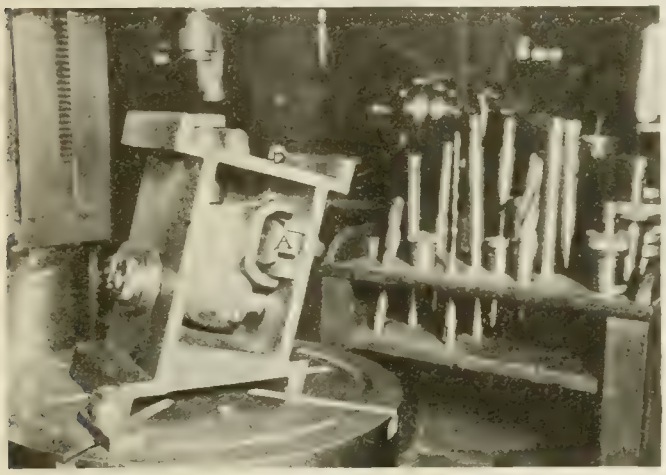


FIG. 6. MACHINING ANGULAR HOLE.

FIG. 7. SLOTTING THE CASTING.

FIG. 8.—A FINISHED CUTTER BLOCK.

FIG. 9. MILLING CUTTING BLOCK.

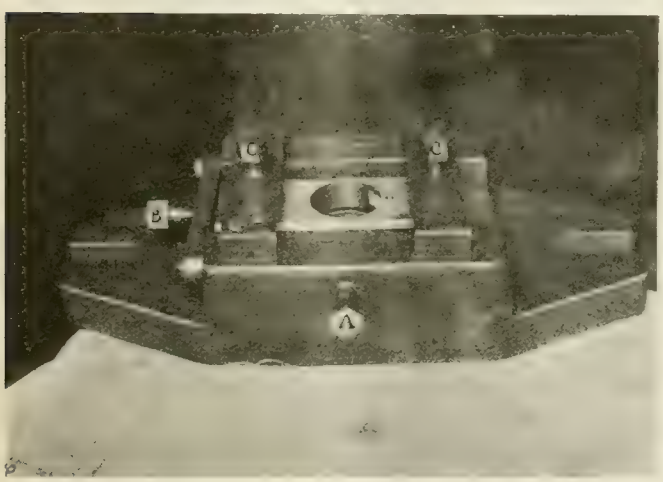


FIG. 10.—MACHINING FOR BASE BINDER

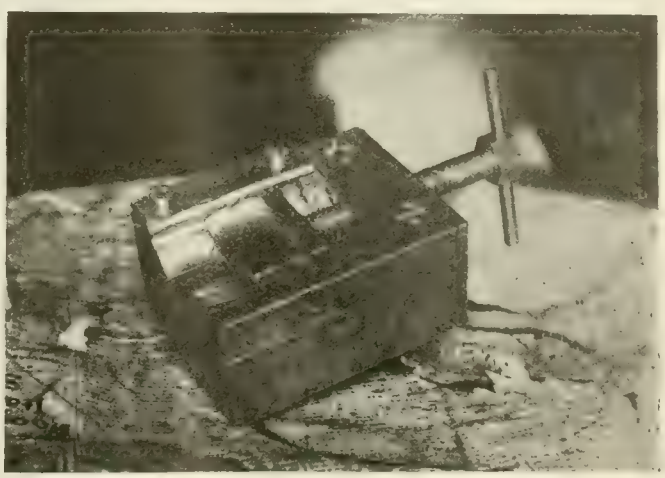


FIG. 11.—MILLING BASE BINDER KEY.

AEROPLANE MOTORS

Types in Use To-day —Method of Operation and Principles Underlying Their Design — Ignition and Carburetion Very Important

By LIEUT. H. POLLARD

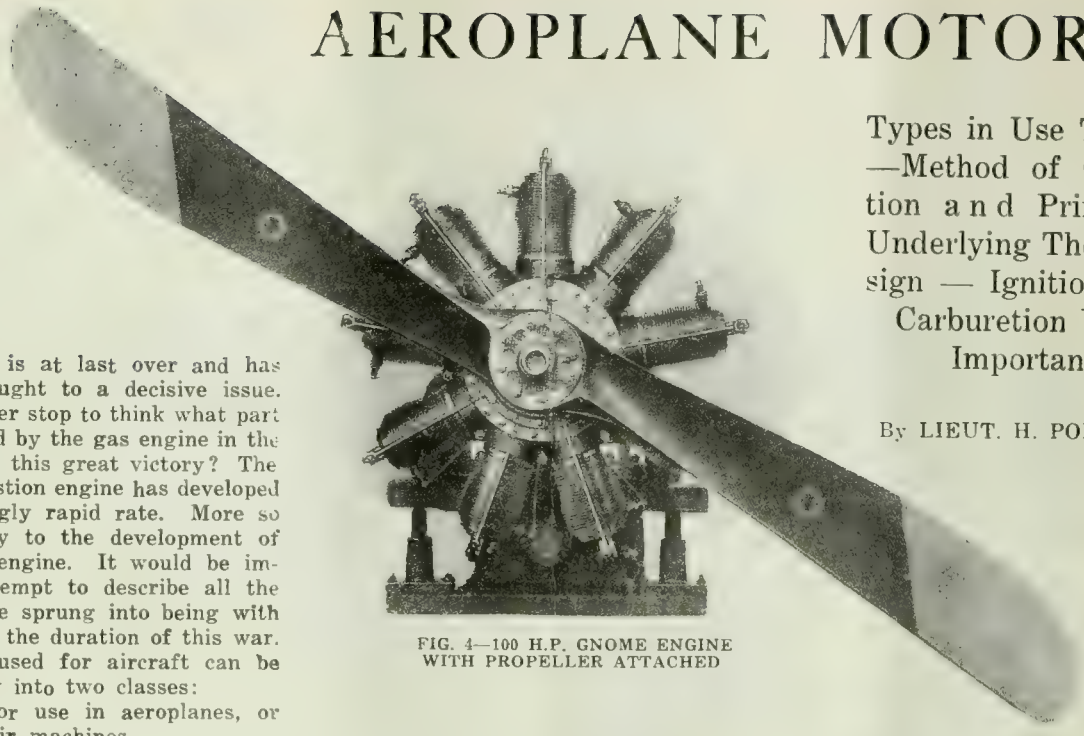


FIG. 4—100 H.P. GNOME ENGINE WITH PROPELLER ATTACHED

THE war is at last over and has been brought to a decisive issue. Do we ever stop to think what part has been played by the gas engine in the achievement of this great victory? The internal combustion engine has developed at an exceedingly rapid rate. More so does this apply to the development of the aeroplane engine. It would be impossible to attempt to describe all the types that have sprung into being with the advent and the duration of this war.

Engines as used for aircraft can be divided roughly into two classes:

(a) Those for use in aeroplanes, or heavier than air machines.

(b) Those for use on dirigibles, or lighter than air machines.

The engines classified under the former heading will be more largely dealt with. It must be understood that it is of the utmost importance that the weight per horse power be at an absolute minimum. The reasons in substantiation of this are:—

(a) To allow of rapid climbing.

(b) To increase the radius of action.

(c) To reduce the weight and increase the efficiency of the gliding angle.

(d) To increase the safety of the machine in a gale.

The need of maximum power with the minimum of weight and bulk has made the aerial type of engine the highest expression of the designer's art. Nor yet has the limit been reached, greater power in relation to weight is constantly being obtained by the employment of new discoveries. The aeroplane year by year becomes more stable, more speedy, and more adaptable to the requirements of peace and war. The future of mechanical birds of German creation has been the subject of many works of fiction, and it may be that the counterpart of that "Clipper of the Clouds," of which Jules Verne dreamed and wrote, will some day sail the skies in reality. This will only be achieved through the aid of the internal combustion engine, which, although it has reached a high stage of perfection, is still capable of further development, if we are to forge ahead in our aerial endeavors.

Internal combustion engines to-day are used in such a large degree that I think it would be wasting the reader's time to occupy more than a brief space in explanation of the fundamental principles. It is well known that the essential parts are a piston which moves up and down inside a closed body known as the cylinder. This piston is connected to the crankshaft by a connecting rod, and the valves (exhaust and inlet) are fitted to allow of the gases entering and leaving the cylinder. A sparking plug is also fitted to enable ignition of the gases.

The Cycle of Operations or what is known sometimes as the Otto cycle is the name given to the four strokes of the piston, which occur in the following sequence: Induction, compression, power, and exhaust, each stroke being of equal duration. This is only a theoretical cycle and in practice is never adhered to. Induction occurs from approximately top dead centre to a little past bottom dead centre; the reason for this is because the piston descends with a higher velocity than that of the incoming gases and were the valve to close at bottom dead centre, which is its true theoretical closing point, we should have weak compression and ultimate loss of power due to inadequate supply of gas being drawn in. From inlet closing to top dead centre is compression stroke ignition occurring a little distance before top dead centre. This is spoken of as advanced ignition. From top dead centre to exhaust opening, which is invariably before bottom dead centre, is power stroke, and from exhaust opening to top dead centre again is exhaust stroke, thus completing the cycle of operations. This is a very brief description of the four-stroke principle on which most of our practical aero engines of to-day are working.

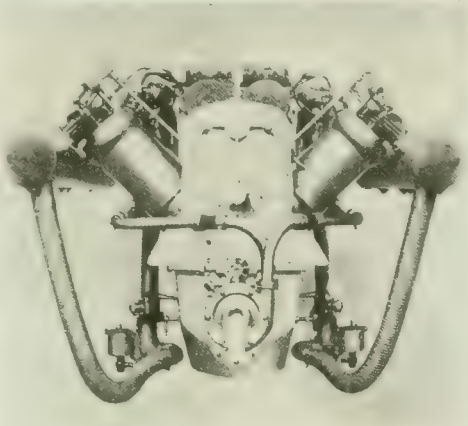


FIG. 1 200 H.P. CURTIS ENGINE.

Engine Types

Engines in general use to-day can be classified under three headings: Stationary or Reciprocating, Rotary, and Radial. Stationary engines, such as the Hispano-Sueza, Rolls-Royce, Sunbeam, Curtiss, and Beardmore, have their cylinders set at an angle and situated above the crankcase, or are vertically above the crankcase, as in the case of the Beardmore or Sunbeam. In all cases, the crankcase and cylinders are stationary, the crankshaft revolving.

In the rotary type, the cylinders are set radially around a fixed crankshaft, the cylinders and crankcase revolving. Examples of this type are the B.R., Le Rhone, Clerget, and Monosonpape.

The radial engine is in appearance very similar to the rotary, having its cylinders set in like fashion around the crankcase, but they are stationary and are usually water-cooled, the crankshaft itself revolving. An example of this type is the Salmson Canton-Mane. The radial type will be but little referred to, as it is only used in small numbers.

The Rotary Engine

The rotary engine, being the most important from an aviation standpoint, requires further description. What is the principle governing its operation, or in other words, why does it revolve? On

examination of the diagram it is found that in any rotary engine there are two centres of rotation, "A" being the centre of rotation for the pistons, around which

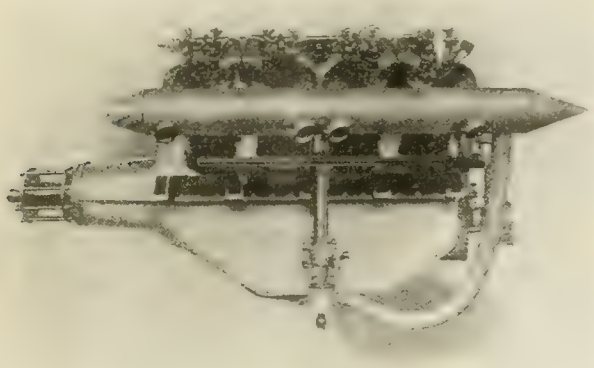


FIG. 2—200 H.P. CURTIS ENGINE

the pistons revolve at a fixed radius; "B" the centre point around which the cylinders and crankcase revolve. The distance between these two centres is approximately half the stroke of the piston.

The diagram shows a piston in a slightly exaggerated position of explosion. The point "C" represents the gudgeon pin and the arrow "P" represents the thrust on the piston head due to the explosion of the gases in the cylinder. When an explosion occurs the force "P" is exerted in the direction of "C" to "A." This, of course, is due to the fact that the pistons are connected to the point A through the medium of the connecting rod. There is also another force in the direction of "C" to

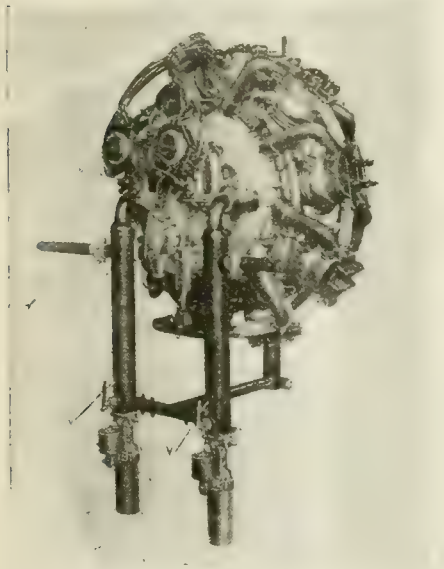


FIG. 3—SALMSON CANTON MANE RADIAL TYPE ENGINE.

"B" set up, due to the fact that the piston is trying to reach the point "B," because it is guided in the cylinder, which is set radially to the centre "B." Now, it is well known to students of mechanics that wherever there is action, there is reaction equal and opposite, consequently there will be the reactions of the two forces C.A. and C.B., and the resultant, shown by the line XY, is resolved into the force R on the leading edge of the cylinder, causing it to revolve. This principle only applies to a rotary engine and not to the radial engine, which is very similar in outward appearance.

Compression

Leaving the general principles of engines, some of the more important details will be dealt with. Of very great importance is the maintenance of compression. In an engine compression is maintained through the medium of well-fitting valves, piston rings and accurately made joints, such as the joint between the cylinder and body, sparking plug and its mounting.

The maintenance of compression must not be confused with the keeping of a piston gas-tight in its cylinder. It has been found from experience that many people have a doubt as to what answer to make to the question: "How is a piston kept gas-tight, and how is compression maintained?" Pistons are made gas-tight by the fitting of piston rings or their equivalent, and compression is maintained as stated above. Oil does not maintain compression as so many are apt to think; it certainly does assist, to a slight degree, and the addition of more oil or a thicker oil may appear to raise the compression of the engine, but it will ultimately lose power from the overheating which will follow from over-lubrication.

Valve Operation

Practically all the valves on aero engines are mechanically operated. In some cases they are operated through the medium of an overhead camshaft; in others, by means of a tappet lifting up a tappet rod, which in turn depresses the valve. In between this tappet and tappet rod there is a small space of a few thousandths of an inch which is spoken of as "tappet clearance." This clearance is to allow of the expansion which occurs after the engine has become heated; if it were not there, after a little while the tappet and the tappet rod would have expanded to such an extent as to cause the valve to remain permanently open. It can easily be seen that this clearance, if altered to any large extent, will materially affect the lift and the length of time the valve is open, and consequently, in a very large degree the efficiency of the engine. It will require no very large amount of perception on the reader's part to grasp this fact, that tappet clearance is not for the purpose of retarding or advancing ignition, as its functions have been mis-described more than once by would-be aviators.

The Crankshaft

The next point to claim attention is the function of the crankshaft and the camshaft on rotary and stationary engines. On a stationary engine the chief duty that the crankshaft has to perform is to transmit the power given to it by the pistons to the propeller which it is driving. In the case of a rotary engine the crankshaft has many more functions to perform. The following list gives a rough idea of the many and varied functions of a rotary engine crankshaft.

1. A point of attachment for the engine to the plane.
2. A point for the pistons and the cylinders to revolve around.
3. A point of attachment for the carburettor.
4. The whole of the thrust from the propeller is absorbed by it.
5. It conveys oil to the working parts.
6. The crank pin provides a fixed point against which the force of the explosion can exert itself in revolving the engine.

It will be noticed that the crankshaft functions partly as a camshaft, inas-

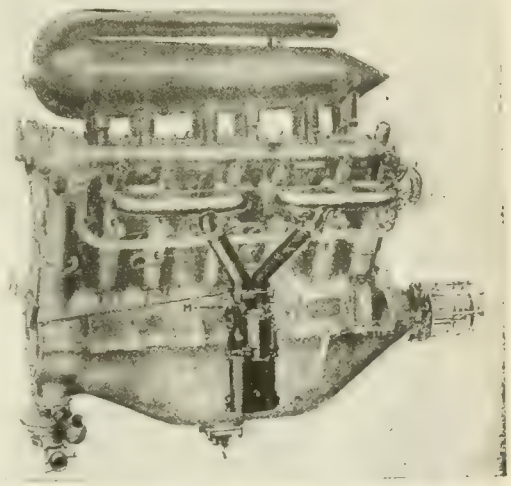


FIG. 5—220 H.P. RENAULT STATIONERY ENGINE.

much as the small end forms a pivot around which the campack rotates.

In studying rotary engines it is as well to bear in mind that the following sequence of build is general throughout all the different types. Starting from the front or propeller end of the engine, and passing to the rear, the build is as follows: The propeller boss is mounted on the nose piece which is attached to the front of the cam box, this in turn being held to the front of the crankcase on which the cylinders are mounted. Bolted to the rear of the crankcase is the thrust box, containing the thrust races, which absorb the thrust of the propeller or air-screw, as the case may be. Bearing this particular form of build

in mind will enable the reader to locate quickly the position of any part of the engine.

Centrifugal Force Effect

Centrifugal force plays an important part in a rotary engine. Any body which is influenced by this force tends to fly outwards in a radial direction. A very well-known illustration is the swinging around of a bucket half full of water, centrifugal force in this case throwing the water firmly against the base of the bucket and thus preventing the water spilling.

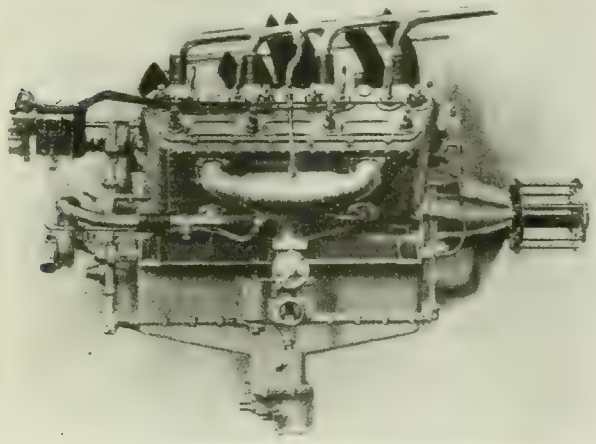


FIG. 6—150 H.P. SUNBEAM STATIONARY ENGINE.

When a truly formed and well-balanced flywheel rotates at a moderate speed no vibration is apparent. Should, however, any portion or section of the rim of this flywheel be heavier than the remaining portions of the wheel, the centrifugal force affecting it will produce an internal stress on this portion, and will ultimately cause that part of the wheel to break away if the wheel is only revolving at a moderate speed; also an acute vibration will be present, due to the unbalanced flywheel. This effect is very easily demonstrated by a simple little experiment with a disc which has three bolts attached in a symmetrical manner around the circumference; when this disc is rotating no vibration is present, but upon removing one of the bolts and throwing the disc out of balance, an acute vibration is shown. This is, of course, only a general illustration.

Take a particular case—the exhaust valve on the Le Rhone engine. When this engine is revolving at moderately slow speeds, the exhaust valve closes at forty degrees before top dead centre, while at the normal rate of revolution for this engine the exhaust closes at five degrees past top dead centre. The reason for this is that mechanically the valve closes at forty degrees before top dead centre, but owing to the influence of centrifugal force at high speeds the tappet rod is hurled outwards, thus depressing the exhaust valve and keeping it open until five degrees past top dead centre. Similarly in the case of the Monosonpape engine, the exhaust valve is made much heavier than mechanical strength demands of it, purely to counteract the influence of centrifugal force on the tappet rods. Thus by making the valve heavier, the necessity of having to fit balance weights to the tappet rod, as is done in the Gnome, is obviated.

From the particular examples given it is apparent that it is absolutely essential in replacing any part of an engine which is affected by centrifugal force, that the weight of the new part should be equal weight with the one it is replacing.

Order of Firing

The different orders of firing which prevail have a marked effect from a balance point of view on the various types of engines. The order of firing on an 8-cylinder vee type engine, say, is 15374826. On examination it will be seen that the cylinders are firing with an interval of time equivlent to a quarter of a revolution, therefore taking two successive cylinders, the impulses on crankcases from explosions occur almost simultaneously. A similar condition exists over the remaining six cylinders, giving a common point of intersection over the complete order of firing. This common point of intersection of the different impulses is approximately over the centre of gravity of the engine. By having the force of explosion localized at the centre of gravity, a minimum vibration is produced. This order of firing gives a maximum balance with a minimum of vibration. In contrast with the preceding example take an engine of exactly similar type, but with a wholly different order of firing, say 12347856, and with the cylinders numbered as shown on the sketch. When this engine is running, there is a tendency to rock longitudinally in the plane, that is, there is a very great chance of an acute vibration being present.

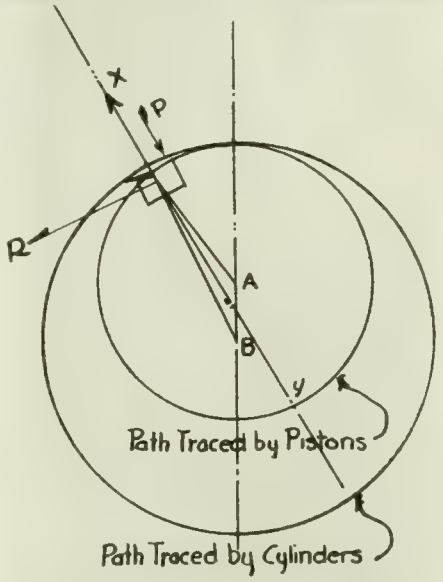


FIG. 7—DIAGRAM ILLUSTRATING THE WORKING PRINCIPLES OF A ROTARY ENGINE.

All rotary engines fire in one specific order, the cylinders being caused to fire alternately, a seven cylinder engine firing in the order 1, 3, 5, 7, 2, 4, 6. Plainly, it would be impossible to fire these cylinders consecutively, or to have an even number, instead of always an odd number of cylinders. If the question were asked, "What is the order of firing of a rotary engine, and why?" the answer would be that the order of firing is 1, 3, 5, 7, 2, 4, 6 to conform to the four-stroke principle, giving a maximum balance and an evenly distributed turning moment. If each cylinder had to be fired in turn, since it requires two revolutions of the engine to give four strokes—one revolution would be all power, and the next revolution would be all exhaust; speed would have to be maintained purely by the excess of energy which the machine had received on the power stroke. Thus there would be a very erratic turning moment with this order of firing.

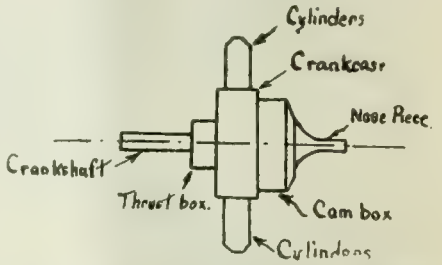


FIG. 8 DIAGRAM ILLUSTRATING SEQUENCE OF BUILD OF ROTARY ENGINES.

Lubrication

The lubrication of engines is accomplished by force and splash. By splash lubrication is meant that the oil is thrown up in the form of a spray from the connecting rod big ends. These ends are sometimes fitted with a scoop which dips into a trough of oil at each stroke, thus supplying the necessary splash. In other cases, it is the excess of oil oozing from the crank pin bearings which is picked up by the whirling crankshaft and thrown up into the interior of the cylinder, oiling cylinder, piston and piston rings.

Forced lubrication is effected by means of oil circulating pumps, divided into two classes, rotary or gear type, and plunger and piston type. The general principle of each of these types of pumps is the same, but they are modified to a certain extent to meet the varying designs of engines. The most elementary form, and one which is very largely used, is shown in the illustration; it consists of two small gears which engage with one another and run in a close fitting casing. Oil enters midway at one side of the casing and leaves similarly at the other side of the pump. The oil is transmitted by the spaces in between the teeth, which form, as it were, small pockets for the oil. Oil is carried around both sides of the casing as shown by arrows, the teeth at the

point of engagement at the other side of the casing forming an oil lock.

It would be well while dealing with lubricating systems, to say a word or two regarding the different lubricants

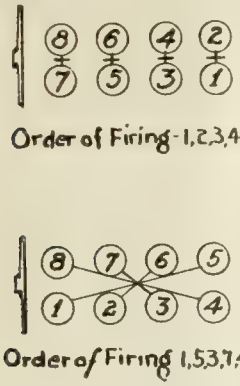


FIG. 8A.

used. On a rotary engine, in every case, a vegetable oil, such as castor oil, or castrol, is used. The reasons for this are that a vegetable oil does not easily mix with petrol; also, it has a higher flash point and a higher viscosity, or in simpler language it is more sluggish in action. There is one point to be guarded against in the use of a vegetable oil, especially in the cold months of the year, Castor oil when allowed to stand for any length of time on a cold day will deposit a sediment at the bottom of the vessel in which it is held, and the oil will become very much thicker. To thin castor oil so that it would again become serviceable, it would be necessary to heat the oil and at the same time stir it well to get the sediment back again into solution. If the sediment were allowed to go into the engine, it would have a very detrimental effect on the bearings. Another way of rectifying this trouble is to mix 15 per cent. methylated spirits with the castor oil. Mineral oil is used on stationary engines only.

Cooling Systems

The cylinder is kept at a practicable working temperature, i.e., about 185 degrees F. by continually circulating water around it, the cylinders being water jacketed. It will be easy to follow that, with the continual exploding of the charges in the cylinder, heat would be accumulating, and unless some means were adopted for keeping down this accumulation of heat, the cylinder would quickly become red hot, lubrication of the piston would be impossible and the motor would soon stop work. Water is the best medium for extracting this surplus heat from the cylinder walls. Circulation is set up in the water system by means of a rotary pump driven from the crankshaft. This pump draws water from a radiator, usually built up of a large number of copper tubes, so as to offer the maximum cooling surface to the air. From there it is forced into the water jackets around the cylinders, combustion head and valve ports, and thence to the radiator again to be cooled.

It is then of great importance that particular attention should be paid to this water cooling system as it is here that most trouble is experienced in the running of petrol engines in very cold weather, especially so in the case of an aeroplane motor.

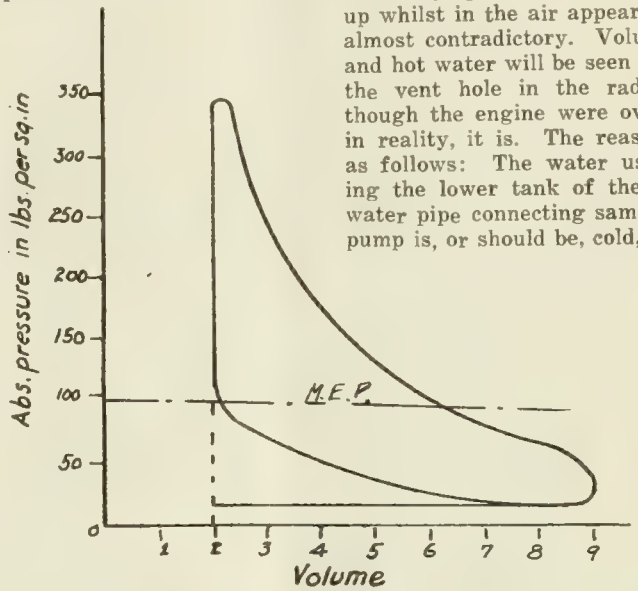


FIG. 11—TYPICAL DIAGRAM FROM A FOUR-STROKE ENGINE.

The reason for so great an amount of trouble being caused by the freezing up of a petrol engine is very simple. It is a well known fact that water in a frozen state occupies more space than it does in its liquid form. Now, as we are unable to dispense with quite a considerable length of exposed water piping in an engine of this nature, it will clearly be seen that the pipes which admit and receive the water to and from the cylinders will freeze up solid first. The water remaining in the cylinder will then be pent up with no means of escape, and as it freezes and of necessity requires more space, the only outlet for it is to burst the weakest spot in its prison, and this is usually the water jacket. This mostly happens when the engine is stopped and stands in a low temperature for any length of time. As soon as the engine is re-started, the heat generated by the cylinders soon melts the ice in the water jackets and water will soon begin to pour from the bursts in the sides of the water jackets. To run an engine in this condition, of course, would be highly dangerous.

The symptoms of an engine freezing up whilst in the air appear at first sight almost contradictory. Volumes of steam and hot water will be seen spouting from the vent hole in the radiator cap, as though the engine were overheating, as, in reality, it is. The reason for this is as follows: The water usually occupying the lower tank of the radiator and water pipe connecting same to the water pump is, or should be, cold, after passing through the cooling tubes of the radiator. This water therefore stands in danger of freezing up, even while the engine is running, and as it does so, it effectually blocks up all circulation in the water system. The water then remaining in the cylinder water jackets must remain

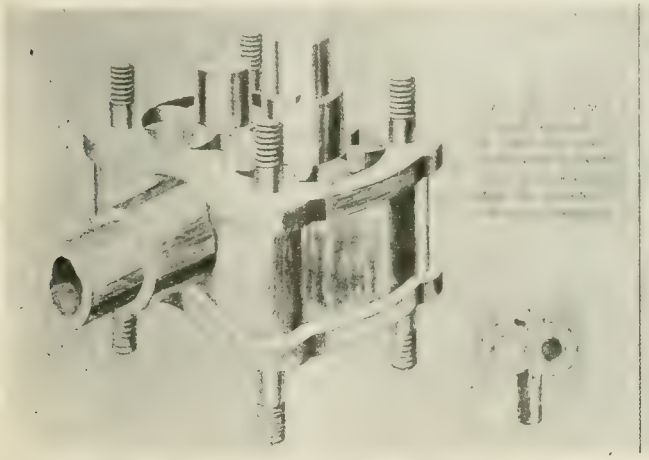


FIG. 9 ROTARY OR GEAR TYPE PUMPS.

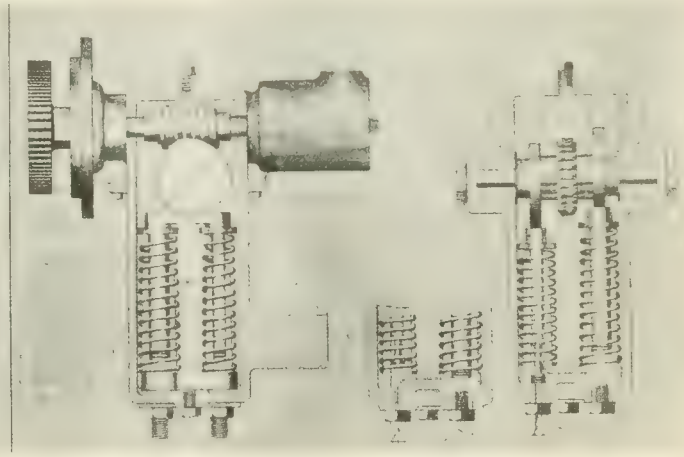
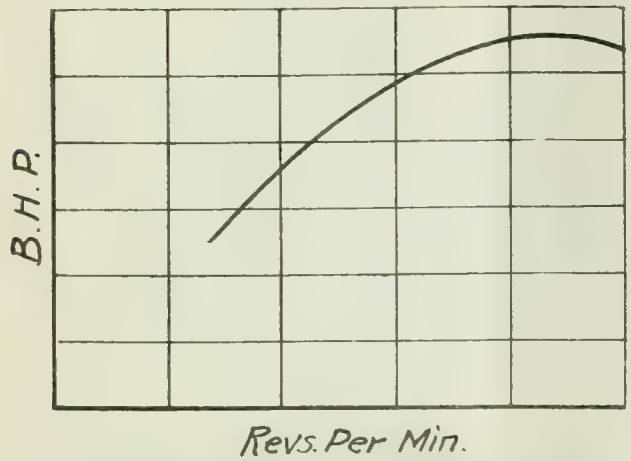


FIG. 10—PLUNGER TYPE PUMP.

there, and as it has no means of being cooled, quickly boils over, giving off the steam first noticed. The engine in this condition will soon freeze up if allowed to run.

To overcome these difficulties then, the cooling fins of the radiator should



12 POWER SPEED GRAPH FROM A NORMAL GAS ENGINE

be covered with a sheet of asbestos or other material so as to minimize as much as possible the efficiency of the radiator as a cooling medium. All the exposed pipes leading from the radiator to water pump, pump to cylinders, and cylinders to radiator again should be bound with asbestos cord and wrapped over this with some cold resisting material such as felting, the whole being bound securely with wire to prevent same from working loose whilst in use. When engines are fitted with a water heated induction pipe, as in the case of the "Curtiss," this should also be wrapped, as the rush of the mixture through the pipe has a cooling effect and the water jacket stands in danger of freezing up.

Experience has shown, however, that in spite of these precautions being taken, cases of frozen water systems are still numerous, and it is advisable to substitute some non-freezing solution as a cooling medium in place of water. For this purpose mixtures of glycerine and water and alcohol and water are used, and sometimes a combination of the two, as for example, sixty per cent. water, thirty per cent. alcohol, and ten per cent. glycerine, which freezes at 10 degrees below zero.

The advantage of the non-evaporating qualities of glycerine is greatly nullified by its being sticky in use, and its setting up a corrosive action in brass and copper. Wood or denatured alcohol and water, therefore, is the most suitable mixture for general purposes, its only disadvantage being that it evaporates quickly. The mixture must therefore be made up to the proper density regularly by adding a certain amount of fresh spirit. The following figures show the freezing point of solutions containing different percentages of alcohol, 20 per cent. solution freezes at 15 degrees above zero, 30 per cent. solution freezes at 8 degrees below zero, 50 per cent. solution freezes at 15 degrees below zero.

A comparison of air and water cooled engines shows that the advantage of a water-cooled engine is longer life and a higher thermal efficiency, due to a smaller loss of work through overheating. The disadvantages attached to a water-cooled engine from an aeronautical point of view are that it is much heavier and also liable to freezing troubles as already mentioned.

As regards the advantages of rotary over stationary engines, the chief advantage of the former is that its weight per horse-power is much less. It is easier to dismantle a rotary engine and it is more accessible. The disadvantages of the rotary engine are that it is a very heavy consumer of fuel and not as reliable as the stationary engine.

"Timing"

Assuming that all engines work on a common basis, that is, the four-stroke or Otto cycle principle, one method of timing may be applied to every engine:

1. Set any piston in exhaust closing position.
2. Set exhaust tappet clearance for that cylinder.
3. Turn the camshaft in the direction of its rotation until the particular exhaust valve for the cylinder being timed is in the closed position.
4. Mesh the timing gears.
5. Adjust the remaining tappet clearances.

Similarly the ignition timing of any engine:

1. Set any piston in ignition position.
2. Mesh the magneto driving gear with the platinum points of the contact breaker just breaking.
3. Wire the distributor terminals to the sparking plugs in the correct order of firing.

Engine Testing

In testing aero engines only the brake horse power (B.H.P.) is considered. It is possible with the aid of very delicate instruments to obtain an indicator diagram which enables us to obtain the indicated horse power (I.H.P.) of the engine. Special optical diaphragm indicators are occasionally employed, however, and with reasonable care fairly accurate diagrams can be obtained. It is, however, an instrument more suitable for the laboratory than for an engineering workshop test room. It is necessary when taking these diagrams to obtain records of several successive cycles as they vary in shape and size so that an average may be taken in determining the mean effective pressure. Once having obtained an indicator diagram it is an easy matter to work out the indicated horse power of an engine. From an inspection of the accompanying diagram it will be seen that it is a simple matter to obtain the mean height of the diagram, which, of course, will be our mean effective pressure. Knowing this we can proceed with the following formula and work out the I.H.P.

The work done per stroke is equal to the area of the diagram, i.e.:

Stroke x M.E.P. x area of piston = work done per stroke.

S x M.E.P. x A = W.

S will be measured in feet.

M.E.P. will be measured in lbs. per square inch.

A will be measured in square inches.

$$W \times \frac{\text{R.P.M.}}{2} \times \text{No. of cylinders} =$$

total work done per min.

One horse power unit is equal to 33,000 ft. lbs. per min.

$$\therefore \text{H.P.} = \frac{W \times \text{R.P.M.} \times N}{2 \times 33000}$$

Brake horse power (B.H.P.) or power at the flywheel, or shaft horse power as it is variously termed, is found by means of a brake dynamometer, of which there are many types. B.H.P. is, of course, less than I.H.P., the difference between these two being the horse power absorbed by the engine internally. The ratio of the B.H.P. to the I.H.P. is known as the mechanical efficiency of the engine.

$$\text{Mechanical efficiency} = \frac{\text{B.H.P.}}{\text{I.H.P.}}$$

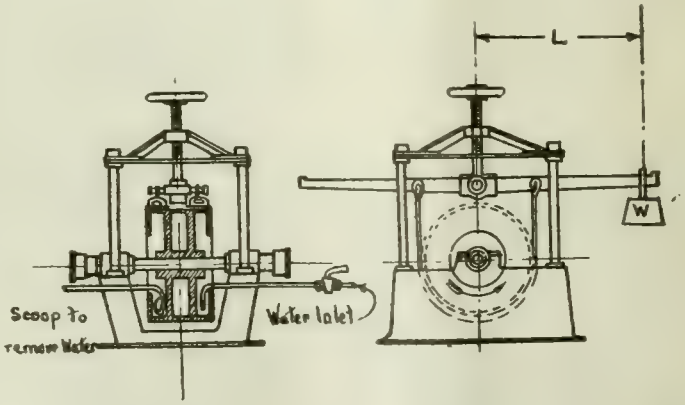


FIG. 13 BRAKE PULLEY FOR GAS ENGINE TESTS.

(Continued on page 52)

Rolling Concrete Reinforcement from Old Rails

Old Rails Make the Best Steel For Concrete Reinforcing When Re-rolled Into the Proper Shapes—Rails Are Slit Into Three Pieces and the Head Used For Reinforcing Steel

By W. S. STANDIFORD

THE use of concrete as a building material has created an extensive demand for steel reinforcing bars, quite a number of mills being engaged in their manufacture as it is very lucrative, there being a constant demand for the bars. In these days of strenuous competition the use of waste materials are being largely used in different lines of manufactures, old rails playing a most important part in the building of sky-scrapers, etc. Some mills make their reinforcing bars out of bessemer steel, low carbon metals being made and marketed. It has been found out by experience that the best steel to make them out of is a metal having a high elastic limit and tensile strength; in fact, the most important factor in concrete reinforcement is the tensile strength and elastic limit of the reinforcing bar. Other things being equal the steel having the highest elastic limit or yield point will be the most satisfactory for reinforcement.

When under strain as soon as the elastic limit of any reinforcing bar is reached the metal stretches, rapidly decreasing in section, drawing loose from the concrete and destroying the monolithic bond existing before this point is reached. Therefore the safety of the entire construction is in direct proportion to the elastic limit of the steel used. Compared to the average run of concrete reinforcing metal on the market the bars made from old steel rails are far superior; the elastic limit of the old rail steel is 50,000 to 60,000 pounds per square inch in either twisted or plain bars as compared to an elastic limit of

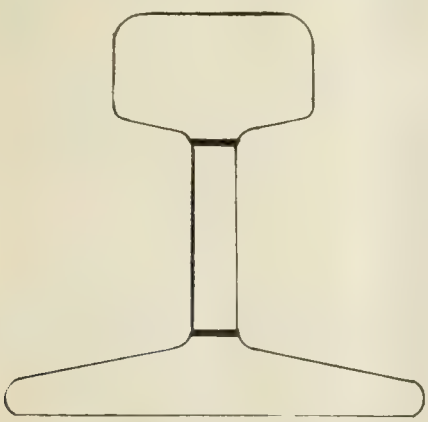


FIG. 1 SECTION OF OLD RAIL SHOWING WHERE THE HEAD AND FLANGE ARE CUT.

25,000 to 30,000 pounds for the ordinary bars. From the foregoing it will readily be seen that reinforcing bars made from old steel rails with its 80,000 pounds minimum tensile strength is far superior for all kinds of concrete work.

In these days of industrial activity, railroad embargoes and slow deliveries of raw materials, the use of old steel rails to make concrete reinforcing bars will often enable mills to fill orders quickly for material for concrete construction that otherwise would have to be delayed until steel billets could be obtained. The size of the rails used to make these bars weighs 100 pounds per yard, and the head only is rolled, the flange and the web generally being used to make small, flat steel bars, and also angles for bedsteads, etc. The rails after 25 years' use on the railroad ties and discarded as useless are sold as scrap by the railroads and can be bought cheaply. On the surface of the head of the rail will be found an occasional sliver, which must be cut off with a cold chisel, as it will not weld in the rerolling process which the metal receives.

The head is then ready to be separated from the web; this may be done by cutting the metal lengthwise in shears, or cutting the steel while it is hot, in slitting rolls. the head being cut at the fillet, see Fig. I; the latter also shows where the web and flange are separated, it being customary in mills manufacturing bars from this product to cut the flange off at the same time so as to save rehandling as much as possible and give three sets of bars for making different sections; the rail heads are then cut up into billets of the desired lengths to make the required lengths of bars as desired by the customer, put into a heating furnace and evenly heated. They are then ready for rolling in the guide roughing rolls, shown in Fig. 2. As these rolls are used for breaking down billets of various sizes to make different shaped steel sections as may be demanded by the consumer, box and edging passes are put in so as to take a 4 x 4 billet and reduce it rapidly, which box and edging grooves usually do. On account of the heavy draft allowed by this type of passes, the

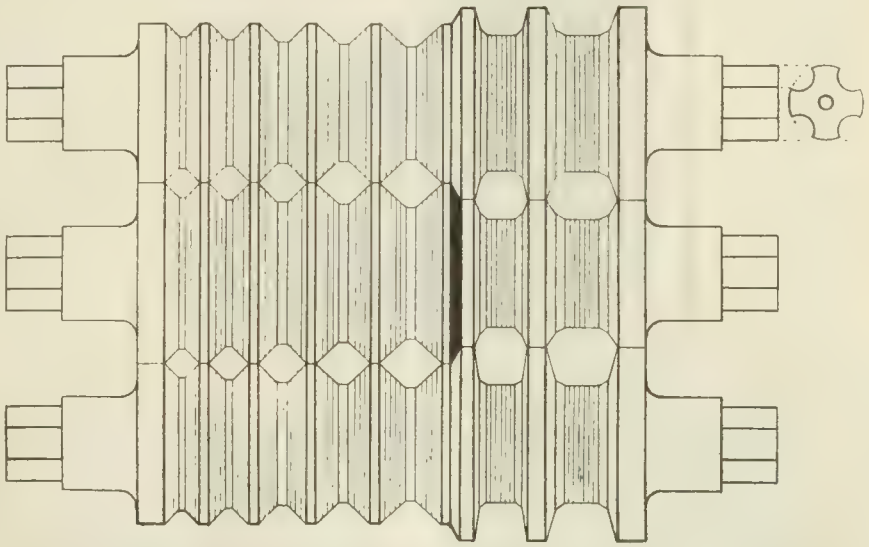


FIG. 2 PASSES IN ROUGHING ROLLS AND GENERAL LAYOUT OF THE ROLLS

use of a 4 x 4 inch billet also allows of longer finished bars delivered by the rolls. That is the reason why passes of this size are put into guide roughing rolls, even if they are only used occasionally for orders where there is a departure from the concrete bars orders.

The box and edging passes are not used in reducing the rail head billet, the latter being put by the rougher into one of the angle passes in the rolls. The 100 pounds per yard rail head billet measures about 2½ inches wide across the top; the thickness at the widest part in the centre of the head at the cut fillet averages 1⅝ inches; the roughing roll angle passes have angles of 97 deg. with fillets in the bottoms, ranging from ⅜ of an inch wide down to ⅛ of an inch. In the photograph the full number of angle grooves are not shown as the pictures would lose in clearness. The rail head billet is inserted into a suitable angle pass in an upright position, guides being used to prevent it from turning over in the pass.

The object of placing the bar in an upright position being to force the bar to assume the shape of the pass so as to make it enter the other grooves easier as the bar has a rectangular shape (which is an awkward section to enter into angle grooves, as there is a great liability of it turning over unless the guides are kept sufficiently tight) it is necessary to repeat the upright inser-

tions in three different sized grooves before it can be made to assume the shape of the angle passes in the rolls.

This is due to the extreme hardness of the metal in the old rails, thus making light drafts necessary at the start of the rolling. Most old rails steel, after 25 years in the services of the railroads, have changed their structure from a fibrous to a crystalline nature; the rerolling it receives restores the fibrous characteristic, putting it in normal condition again. After the bars go through three passes in an upright position they then have the shape of the angle passes and this allows the rougher to turn the bars over on all sides and thus work the parts that lie near the joints of the rolls. All angle grooves mostly work the bars on the bottom of the fillets, and the object of having fillets in these passes is to work the metal on the corners of the bars as much as possible, there being no work done on these parts of the bars that lie near the joints between the rolls. In both the roughing and strand sets of rolls the use of fillets in the bottoms of the grooves compresses the metal on the corners of the bars.

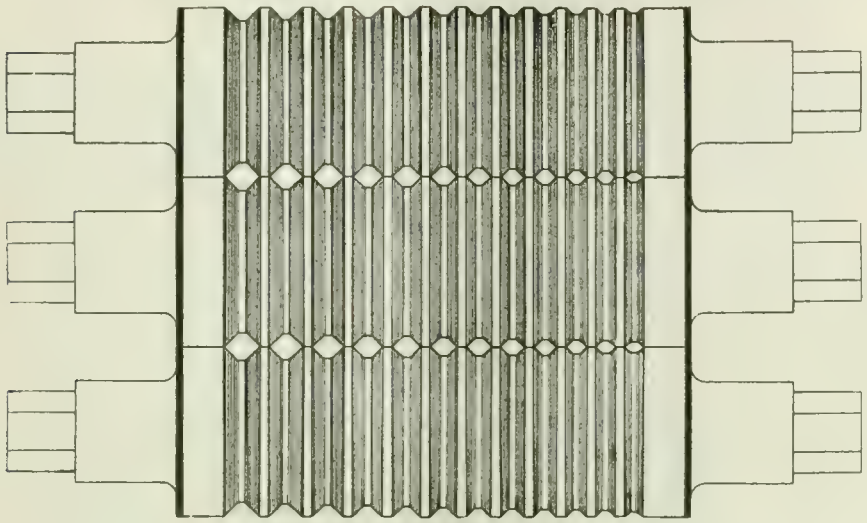


FIG. 3 -STRAND ROLLS DESIGN.

When the bars assume the shape of the angle passes in the roughing rolls they are then turned over on their sides and put through each succeeding smaller pass and are then ready for the strand rolls illustrated in Fig. 3. These rolls, made out of chilled iron, have their passes more closed in, their angles being 92 degrees; the fillets also are smaller. The small fillets are put in so as to make sharper corners on the finished square, as if the fillets are too large in the strand roll grooves the bar will not form sharp corners on the diamond to make a square having sharp corners. Diamond grooves are only capable of sustaining a limited amount of draft, and when the fillet is too large on the strand bar it will not fill the pass area out but makes rounded corners on the top and bottom of the diamond pass bars.

The steel bar is now transferred from the roughing rolls to the strand ones and pushed through them until a size of 1¼ inches is obtained. The bar is run through the first pass twice, it being turned over at a right angle to its previous position before it is run through the last time. The object of this is to have the four corners of the strand bar possess the same thickness in order to make a perfect finished square. If the strand bar had two of its corners larger in diameter than the other two, thus making a lopsided bar, the extra metal would squeeze out in the diamond pass at the joints of the rolls, thus making a heavy fin which would double over and show a lapping mark on the finished square.

There is also danger of the collars between the diamond passes breaking out when any pass is overfilled and the metal extends between the collars of the revolving rolls. The writer has seen many roll passes rendered useless by incompetent roller's careless setting and handling of the rolls. The steel strand bar being rolled to size is now ready for the diamond rolls; these rolls, unlike the roughing and strand rolls, are a two-high, as it is only necessary to run the strand bars once through the diamond pass. Diamond groove angles vary from 97 degrees to 110 degrees; the variations of different degrees of arcs between the above mentioned angles are used to suit the individual requirements of the mill, such as engine power, methods of heating, the temperature at which the diamond bars are run through the finishing squares and other local factors, all of which have a most important bearing on the tonnage output of the mill.

The grooves most generally used and put into the diamond rolls by the roll turner are as follows: ¼, ⅜, ½, 9-16, ⅝, 11-16, ¾, ⅞, 1 and 1⅛ inches. In some mills, due to the rolls not having a long body length, it is customary to have the smaller sized grooves put into a separate set of rolls, but it is best in all cases where possible to have as many different sizes of passes as can be gotten into one set of rolls. This reduces the changing of rolls to a minimum and conduces to a greater output. The greatest losses of time in the average rolling mill are due to the changing of rolls frequently by having longer rolls with numerous housings containing rolls to make different sections; any set of rolls can be coupled up and gotten into action quickly by the roller. The angles of the diamond passes to make the square for manufacturing the reinforced concrete bars is 104 degrees. The total width of the diamond bar to make a one inch square is 1⅝ inches, the thickness being 1¼ inches measured over the top and bottom corners of the bar. The strand bar goes once through the diamond pass; the size of the diamond bar as given above is subject to slight variations in size by the roller, who raises or lowers the rolls to suit the working of the metal in the rolls, as each lot of old rails made by different makers varies in its working in the rolls. What the roller mostly pays attention to, is to see that the passes are filled out to their utmost area without overfilling; by doing this the bars have as sharp edges in the pass at the centre of the bars as it is possible to get them.

The action of the diamond roll groove on the strand bar is very uniform, the strand bar being inserted with two of its square sides facing the top and bottom of the diamond pass instead of the fillet ends of the strand bar facing downwards towards the sharp edges of the centres of the pass. Of course the strand bar could be inserted in the above-mentioned position and would make a good appearing diamond bar, but it is better to place the strand bar with its side facing upwards instead of a fillet facing towards the bottom of the pass for the following reason: as the bar has been rolled in the strand passes mostly on the angle, it is better, in order to make the metal more fibrous in nature, to change the angle at which the steel is reduced, hence the advisability of having the strand bar enter the diamond groove in an up-

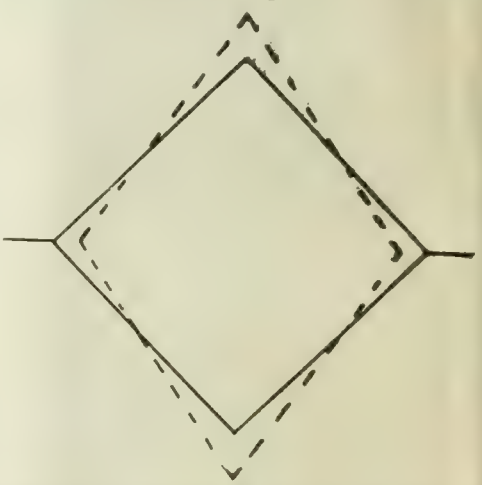


FIG. 4 An enlarged square pass showing the position of a bar from the diamond rolls going into the square pass of rolls illustrated in Fig. 5. The diamond rolls being practically the same design as the squares, the only difference being in the number of degrees contained in the angles of passes. The violent change in section from a diamond to a square makes the metal fibrous in texture.

right position. It is an axiom of good roll designing that frequent changing of the rolling position of iron and steel bars in passes makes the metal more fibrous in nature, and the fibrous condition of these metals is what enables them to withstand strains and rough usage.

This is what every manufacturer of iron and steel products strives for as it is realized by them that a high-grade product generally brings repeat orders, it being the latter that counts in these days of strenuous competition. In the diamond groove the metal of the strand bar, as it is inserted in an upright position, meets the slanting sides of the pass and the flow of the metal is forced toward the centre of the pass. This causes an entirely different structural change of the molecules of the metal, they being rearranged in an entirely different manner to suit the shape of the pass.

As the bar is now near the finishing pass in the square rolls, its elastic limit and tensile strength are very nearly up to the maximum limits of the metal, and the finishing touches are given it in the square rolls illustrated in Fig. 5; these rolls have the grooves cut into them on an angle of 90 degrees. This is done so that the finished bars will leave the rolls easily without any shearing of the metal, which otherwise would be the case if the grooves were put into these rolls with the flat side of the bar parallel to the rolls axis; the groove being absolutely straight on sides in a case of this kind, the straight sides of the pass would rub against the sides of the bar, thus causing the metal to cling to it and shear off portions of the bar, with a strong possibility of the metal jamming in the rolls, it depending upon the condition of the bar's temperature.

By putting the square grooves in on an angle all chances of shearing are avoided, the rolls working very nicely and making an accurate sized bar if the roll turning and roll setting have been carefully done. It is a fact that no matter how accurately the passes have been put out into the rolls by the roll turner, if the roller is incompetent or careless, he can, by his handling of the rolls, make a faulty sized and bad looking bar; the blame for which he naturally puts on the roll turner. The latter, if he understands his business, then goes out into the mill and set the rolls so that they will make good bars; this wastes the roll turner's time which should be spent in turning rolls and not in the mill doing other people's work. Faulty bars are made by not having the strand pass filled out properly, unequal sized corners on the strand bar, and the diamond pass bar not containing enough metal to make a good square.

The square passes in the rolls being crossed; that is, the edges of the passes are not in line with one another, and the temperature at which the diamond and square bars are rolled also has a most important influence in the making of a good finished product; for instance, if the diamond bar is inserted into the finishing square pass at too high a temperature, the metal, being in a very soft condition, will be reduced too rapidly and overfill the pass, spreading out on the collars; if, on the other hand, the diamond bar is too cold it will resist the rolling pressure so strongly that it will not fill out the pass to its fullest area. Should the bar be unevenly heated by the heater and contain some cold spots on it the bars will be uneven in size, some parts being larger in diameter than others.

This is due to the fact that when the cold spots go through the rolls the latter springs more than it would when rolling metal that has been evenly heated; if there are a number of cold spots on the bar the finished product will be wavy in appearance and size, thus it will be seen the most important part that even heating plays in the manufacture of steel and iron. In the square rolls illustrated in Fig. 5, the collars of the rolls are shown as touching one another in actual practice; theh turning of the collars of the rolls are so arranged that the two end collars are 1-64 of an inch larger in diameter than the others.

This allows a small amount of light to be seen between the middle collars when the end ones are touching one another. The object of this is to prevent the narrow collars between the passes from breaking out (as chilled iron is a very brittle material) as they slam down on each other after the bar has passed through the rolls, the broad end collars taking the shock of the spring.

When a bar first enters the rolls the latter springs upwards; this is due, not to any bending of the rolls, as the latter is a negligible factor in short guide rolls, but it is due to the wear on the threads of the housing screws, the latter taking to a large extent the shock of each bar as it enters a pass. The spring between a pair of rolls is 1-32 of an inch, which is allowed for in the turning of the rolls; as the end collars are made 1-64 of an inch larger in diameter than the others it may be thought that the end passes next to the collars would be lop-sided, thus having one side of the square longer than the other.

In order to show that this view is erroneous, the methods of turning will be described. The roll is first faced off level, then the passes are cut in with a tool having a 90-degree angle to the correct depth, a divider being used to make sure that each side of the square is equal in length; after all of the passes are finished a facing-off tool is put in the lathe, it being of such a length and placed so that the ends of the tool projects ¼ of an inch over and on to the end colars. A small shaving of metal is then taken off the collars, thus leaving them all of the same diameter with the exception that the portions of the end collars that extend nearest the necks are larger in diameter.

The 1-64 of an inch of light between the middle collars of the rolls, added to the 1-32 of an inch of light caused by the springing of the rolls, makes 3-64 of an inch open space, when a bar is passing through. Added to this amount of light is also the shrinkage size, which makes the light space between the collars nearly 1-16 of an inch, this amount being the distance between the collars of the rolls for a 1 inch bar. It being necessary in all cases to have the hot size of a finished square larger in diameter than when it is cold, as it cools to the required dimensions, now it is evident that as the finishing rolls are apart, when a bar is passing through that the two corners of the square at the joints of the rolls would be blunt and rounded in shape, if an ordinary strand bar was inserted directly into the square pass. Hence it is found advisable, in practice, to use a diamond-shaped bar, and put the latter into the square groove in a vertical position. This places the sharp corners of the diamond bar in the square groove, opposite the joints of the rolls. In Fig. 4 the position that the diamond bar occupies in the square pass is represented in dotted outline. It will be observed that the diamond bar does not quite extend to the corners of the square pass, and that it also is actually longer than the distance between the centre corners of the square in the top and bottom rolls.

The reason for this is the necessity for having a sufficient amount of draft on the diamond bar to just fill out the sectional area of the square pass so as to make a good bar. As the corners on the diamond bar that faces the joints of the square rolls are already made, the change of angle from a diamond to a square keeps its corners sharp, the result being a perfect square is made if the roller has used judgment in handling

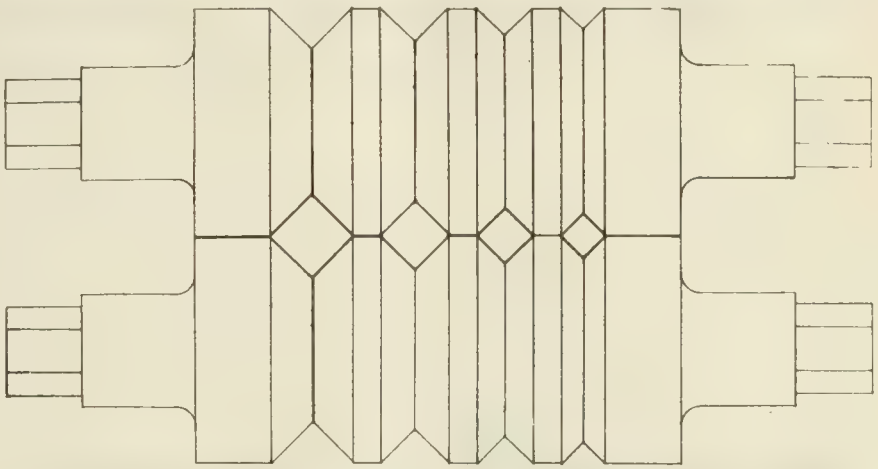


FIG. 5. SQUARE OR FINISHING ROLLS SHOWING PASSES FOR MAKING DIFFERENT SIZES OF CONCRETE REINFORCING BARS.

Continued on page 65

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

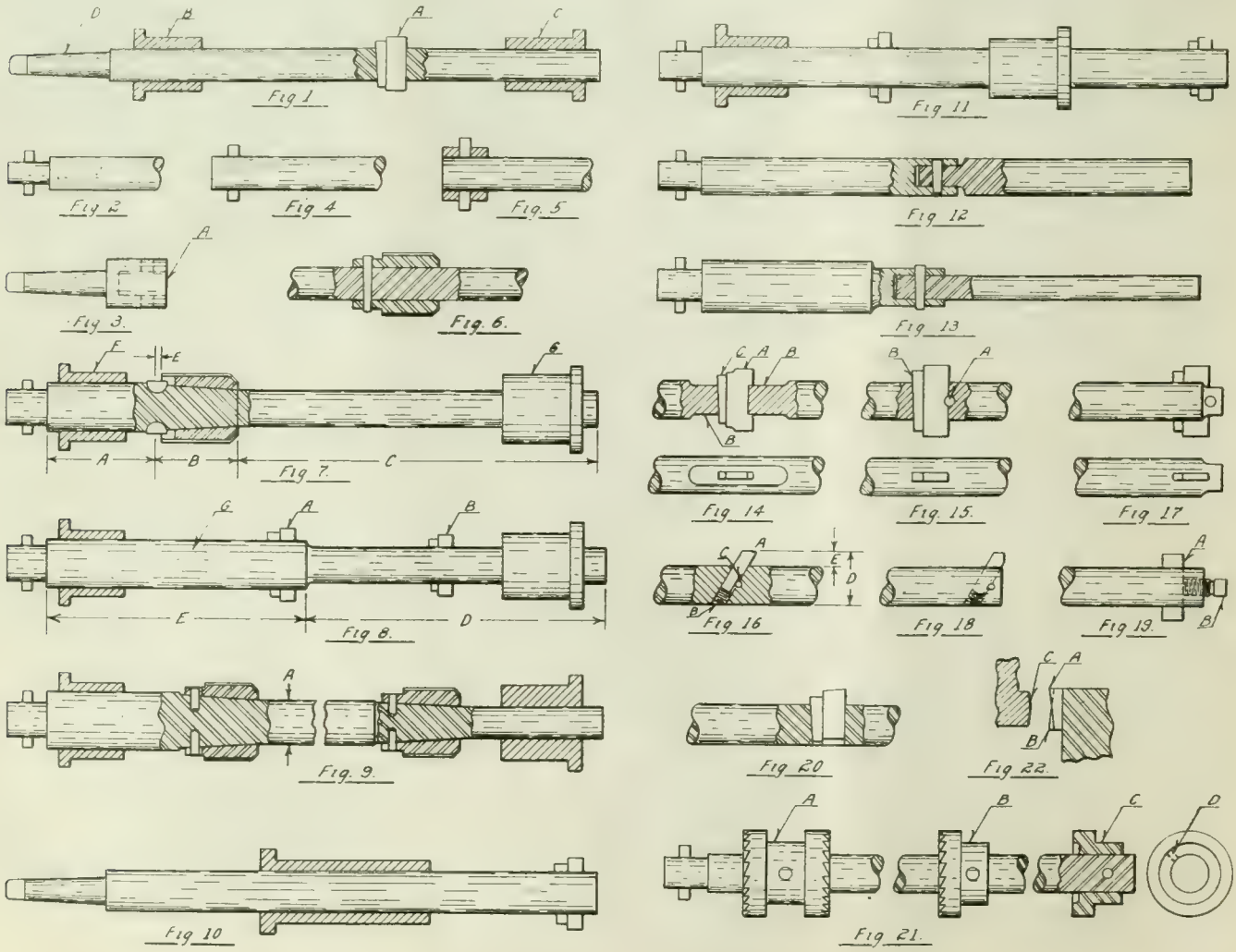
BORING BARS AND BORING CUTTERS

By P. WASHINGTON

A BORING bar must have a good running fit in the bushings, it must be as rigid and heavy as possible, straight and ground concentric. When the bar has been turned and once ground to the correct size it should never be put in a lathe and filed, or emery cloth used on it. Boring bars are made from machine steel and are not hardened. Small bars are sometimes made from tool steel and hardened, in order to give them additional stiffness. Shanks for reamers, and facing bars, should be made in the same way as boring bars, but, if possible, should even be stiffer.

The most common type of boring bar is shown in Fig. 1, the cutter A being located at about the middle of the bar, and the bar being guided at both ends by bushings B and C. The bar is provided with a taper shank at D, fitting the spindle of machine or a collet connected with a knuckle joint. It is common practice to turn down the end of the bar, as shown in Fig. 2, to fit a knuckle joint or a collet shown in Fig. 3. Sometimes the bar can be left full size, as shown in Fig. 4, and sometimes the end is even made larger than the bar, by forcing on a collar, as shown in Fig. 5, in order that the end may fit the driving collet. A key is passed through the end of the bar for driving it; this key fits in the slot A in the collet shown in Fig. ".

The bar shown in Fig. 1 can also be used for facing purposes, the cutter A being taken out, and a facing cutter inserted. The same bar can also be used for a special shell reamer, when this has a straight hole, the reamer being held to the bar by a taper pin, as shown in Fig. 6. Standard shell reamers have a taper hole, and for these the bar must be turned with a taper part, as shown in Fig. 7, where the part A is turned up to the largest size possible (generally 1-32 or 1-16 inch under the diameter of the reamer); part B being turned to fit the taper hole in the shell reamer, is left long enough to permit the reamer



DIFFERENT KINDS OF BORING BARS.

being pressed up tightly without touching the shoulder D. As a rule, the taper part is so dimensioned that 1-8 inch will be left at E, between the shoulder of the bar and the back of the shell reamer, when this is forced up as far as possible. The reamer is driven by keys or pins entering in a slot cut across the end of the reamer. The part C of the bar is turned down to some standard size, just below the size of the small end of the taper hole in the reamer. The bushings F and G may be made with the same outside diameter, fitting the same size lining bushings in the jig, their inside bearings beng made to fit the large and small diameter of the bar.

A boring bar used for boring out two holes of different size may be made as shown in Fig. 8; A and B are the cutters for the two holes, and part of the bar C is turned down for a length, D, to suit the small hole. The part E can then be made of as large diameter as permissible for boring out the hole for which tool A is used. By making the bar in this way, a more rigid construction is possible than if the part E were turned down to the smaller diameter required by the hole bored by cutter B There may be more than two holes of different sizes in succession, and then the bars may have a greater number of steps; if there is but a slight difference in the sizes of the holes to be bored out, it hardly pays to turn down steps on the bar. The stepped bar may also be used for facing bars. While these small matters may be unimportant and elementary, they must be taken into consideration when designing a set of expensive tools for boring jigs, which are to be in constant use where accuracy is to be maintained.

Reamer bars for reaming out two or more holes simultaneously may be made as shown in Fig. 9, providing the diameter A is large enough for turning the taper portion for another shell reamer of smaller size. Should the diameter be too small to permit this, an extension can be provided, or a separate bar used for the smaller reamer. The principle of stepped bars can be applied also where the cutters are placed, as illustrated in Fig. 10. The principal features of this bar are that the cutting tool is always located at the end of the bar, opposite to where it is driven, and that there is but one bushing or guiding. This bushing should be as long as possible to give a good bearing and prevent the bar from wabbling. Sometimes, as illustrated in Fig. 11, the jig is made with two bearings, which, however, are on the same side of the cutter, and a comparatively short distance apart.

Sometimes a bar must be made in two parts. The reason may be that one solid bar would be too long to permit of its being pushed into the jig from one side Another reason may be that the cutting tools are too large to pass through some intermediate hole. The two parts of the bar may be connected with a taper pin, as shown in Fig. 12, the end of bar A being a sliding or driving fit in the hole in section B. This bar should be ground after the two parts are assembled, so that they will run exactly true with each other. A stepped bar made up of two sections is shown in Fig. 13

Cutters for Boring Bars

The cutters used in boring bars vary widely. The cutter A, Fig. 14, is commonly used. It cuts with both ends, and is centred by the two flats B, milled or filed on the bar; a slot is provided in the cutter which fits these flats of the bar. After the cutter has been put in place, it is tightened by the Key C, and is turned to the correct diameter required and then hardened. A more modern arrangement is shown in Fig. 15. The cutter here is a plain rectangular piece of steel, cutting with both ends. It is centred by the pin A, which is driven into a hole drilled so that one-half of it passes through the slot in the centre. As in the former case, the cutter is turned down to the right diameter when in place. It is tightened down by the key B. This way of locating the cutter centrally has proven very satisfactory.

Facing cutters may be located and held in place in the same way. They are longer than boring cutters, being intended to finish a boss or seat around a hole, but otherwise they are made to about the same dimensions.

Single-ended boring cutters, as shown in Fig. 16, are used to a great extent, and it is claimed that they give a more perfect hole. The illustration shows a common way of securing the tool; the cutter A, which is made of drill rod or other round tool steel stock, fits a hole bored at an angle of sixty degrees with the axis of the bar, and is adjusted by a headless setscrew B. When adjusted, the cutter is held rigidly in place by the pin C provided on one side with a flat tapering portion, which fits against the flatted side of the cutter, as shown in Fig. 16. This cutter is very easily set by taking a measurement D with a micrometer. Subtract from the dimension D the diameter of the bar, thereby obtaining dimension E. Add E to D, thereby obtaining the diameter of the hole which will be cut. The screw may have to be adjusted a few times to obtain the desired result. The two kinds of cutters referred to may also be used on the ends of the bars, as shown in Figs. 17 and 18. The cutter of the type shown in Fig. 15 may be held in either of the two ways shown in Fig. 17 and 19. In the latter case the cutter is spotted at A, and held by a pointed screw B. This method does not always insure accurate results. The simplest kind of single-ended cutter and the manner in which it is held, is shown in Fig. 20. It may be used in any kind of bar, and, with ordinary care, good results may be obtained even with this simple tool. The variations possible are many; and the examples shown simply indicate the most common practice.

Facing cutters may be made similar to boring tools, or they may be made with teeth, similar to end milling cutters, as shown in Fig. 21. One of the cutters A cuts with both sides, while the cutter B cuts with one side only. The bar is provided with a slot and with notches for locating and holding in place the various cutters, as shown at C. A pin D is driven into the cutter, and enters the notch, thus driving the tool. The cutters can also be held on the bar by taper pins, but the putting in place and the removal of the cutters would then be much slower.

Different cutters are commonly used for roughing and finishing. To make it easier to remove the metal with the roughing cutter, it may be made with every other tooth beveled in opposite directions, as shown in Fig. 22, where A is one tooth beveled toward the centre, and B the next tooth beveled outward. Using a cutter of this kind will produce a surface as indicated at C, which must be faced squared by a finishing cutter.

In order to face the work to correct dimensions, stops are sometimes provided which strike against some finished surface, which stands in a given relation to some other surface.

MANUFACTURING A MILLING AND GEAR-CUTTING ATTACHMENT—I.

Continued from page 53

The centre hole is then drilled and bored to 1.375 inches.

A Woodruff keyway is next machined, which may be seen at the right hand side of the large centre hole.

The dovetail is then scraped until it is a good sliding fit in the cutter block.

The next operation is drilling the small binding screw hole 5-16 x 18 threads, using a simple jig located from the vee and bored hole.

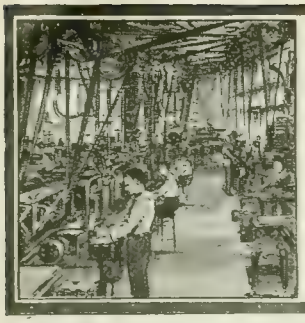
The base binder key is made from a bar of semi-circular steel, the first operation being cutting to length.

Three of the sections are then placed in the fixture, Fig. 11, being held in place with the pin-headed setscrew as shown.

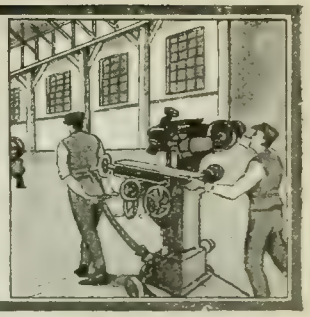
The interesting feature of this tool is the concave surface, against which the keys rest. This is made with an angle of 10 deg. so that after the key (the fixture shows two of these already machined) has been milled the concave surface will possess this angle.

The key is then placed in a simple drill jig, being located by its outside contour and a small pinhole drilled.

Dismantling Plant.—The Willys-Overland Limited, West Toronto, is completing its work on aeroplane engines for the British Government, and to make a way for its motor car programme, plans to dispose of machinery, equipment and tools procured especially for its aero-engine contract. This machinery consists of the finest type of machine tools, and the Company will shortly be in a position to supply intending purchasers with lists of machinery and tools, from which tenders can be sent in to the company. These lists will be sent out upon request.



DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE BLOMQUIST-ECK HORIZONTAL BORING MILL

IN designing the Blomquist-Eck horizontal boring, drilling and milling machine, the Blomquist-Eck Machine Co., Cleveland, Ohio, constantly bore in mind the working efficiency demanded of a tool of this type in practically all lines of manufacture. Realizing that it was impossible to do heavy accurate boring and milling on a low, shallow bed or base with large openings both front and rear and directly under the column where the greatest stresses and strains exist, they originated a deep bed or base of a box pattern and eliminated an inherent fault.

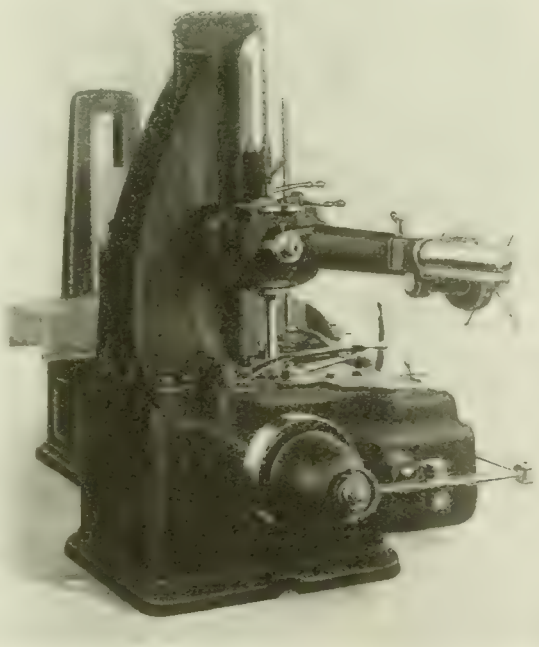
The working efficiency of any horizontal mill and drill depends entirely upon its ability to operate upon all classes of work at the highest speeds and coarsest feeds practicable and at all times to produce a finished product of dependable accuracy. These points have been developed to the highest degree by combining rigidity, accuracy, a suitable range of selective speeds and feeds with the highest standard of material and workmanship.

A complete system of jigs, fixtures and gauges are used, insuring a uniform standard construction throughout as well as the interchangeability of parts. The various groups of mechanism form complete individual units, and any unit can be inspected, removed or replaced without disturbing the alignment or any adjoining unit.

The bed or base is an unusually wide and deep box section cast entirely in one piece. The outer walls directly under the column are left intact without cored openings which adds greatly in resisting the lines of stress. Chip chutes are provided and so aranged that their walls give added strength. The bed (directly under the column) is reinforced by sections tied together and cast integral with the base. The bed is further reinforced by heavy deep ribs running lengthwise, and at right angles the three point support or bearing is also incorporated in the construction, forming the best known foundation principle.

The column is very rigid box section in design, strongly braced internally by ribs in both horizontal and vertical positions. The tapered sides and base of the column give the machine a neat, substantial, rugged appearance, also providing a liberal bearing upon the bed, eliminating deflections and spring.

The spindle saddle is designed with a liberal bearing surface on the face of the column, a long, narrow guiding edge with single screw adjustable taper gib for adjustments on one side and square lock form with gib on the other side. This construction will always maintain and insure a perfect alignment for the spindle saddle. The centre of the spindle in the spindle saddle is placed close to the column face (reducing overhang to a minimum) without sacrificing strength



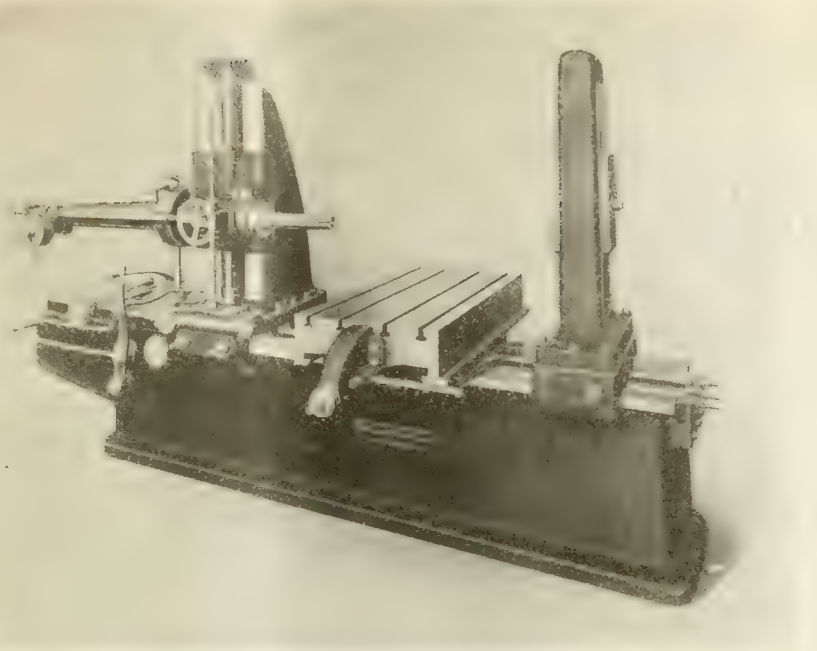
END VIEW OF BORING MILL

at a point most desired. The elevating screw, which is between the column faces and the spindle, is placed in such a predetermined position in relation to the narrow guide that the vertical movement of the saddle is direct and accurate. The units comprising the spindle and saddle are counterbalanced by a weight within the column, thus relieving the elevating screw of wear and tension.

Spindle is made from carefully selected high carbon steel, heat treated, ground its entire length, bored Morse taper and provided with end thrust for operating in either direction. Spindle sleeve consists of a hammered high carbon steel forging accurately ground inside and out, thereby insuring a perfect uniform spindle bearing. The front and rear spindle sleeve bearings are adjustable and tapered, made of genuine Government bronze. Either bearing can be adjusted to compensate for wear. Sight feed oil cups provide an adequate lubrication.

The boring bar support is raised or lowered in unison with the spindle saddle by a shaft and a set of planed steel bevel gears. The bar support or bearing proper is securely clamped by a lever binding bolt at any position.

The spindle is powerfully designed and well adapted to the heaviest and finest class of work. The close coupled drive gear shafts, mounted on S K F double row self-aligning ball bearings, transmit the power to the spipndle in a most direct and practical manner. All shafts are made of high carbon steel. Hardened steel ring spur gears, heat treated, are used wherever possible and these are shrunk on to cast iron hubs. The smaller spur gears in the drive are made of solid steel and heat treated. The bevel gears are made of hammered steel forgings planed from the solid. The speed changes are made by two levers at the front of the machine which operate the selective sliding gears. The base is proportioned in such a manner to properly locate the entire driving mechanism and each individual shaft and bearing can be removed or replaced without disturbing any adjoining unit. Access to the entire unit may be had through an oil-tight top plate cover, the removal of which permits an easy inspection when required. All gears run in a bath of oil and in addition a positive



BLOOMQUIST-ECK BORING MILL, FRONT VIEW

cascade oiling system is provided for both gears and bearings.

The feed to the spindle in either direction to the spindle saddle in raising or lowering upon the column, to the table saddle paralleling the bed, or to the table longitudinally upon its saddle, is introduced in the same direct positive geared manner as applied to the spindle drive. Shafts are made of high carbon steel mounted on S K F ball bearings. Gears are of steel and heat treated. The feed mechanism in the base is arranged so any unit may be removed or replaced without disturbing any adjoining unit. All gears run in a bath of oil and in addition a positive cascade oiling system is provided for bearings and shafts. The feed changes are made by two levers which are placed directly in front and at the top of the gear box. In addition there are three selective interlocking levers provided that engage either the spindle, vertical or table feeds. If the spindle feed is being operated, the table and vertical feeds are automatically locked or vice versa. No two conflicting feeds can be engaged at the same time. In operating star feed facing heads or work of similar nature all feed levers can be positively locked in a neutral position.

Convenience and safety is provided for the operator by placing all controlling levers to the front and high enough so he has no occasion to stoop or reach beyond that of his normal working position.

The bed surfaces were designed and so proportioned that enable the use of a long, deep, rugged saddle to compensate for any overhang of the table at the extreme front or rear positions. When the table is in either extreme position it is supported in the saddle practically three-fourths of its entire length. The saddle is gibbed to the bed by the square lock method having a long narrow guiding edge with a taper gib for adjustment. Perfect alignment is always assured. The table is of an improved extra heavy pattern, long, wide and deep. It is reinforced by heavy ribs, and the metal being of a special analysis is so disposed to resist the greatest strain that might be imposed. The T slots are planed from the solid. The table is securely gibbed by the square lock method which in this instance reinforces and resists any strains when the table is in an overhanging position.

Power rapid traverse of a friction type is provided for all members operated by the feed. Regardless of whatever feed may be engaged the rapid traverse always operates at one rate of speed in either direction. It is instantly engaged or disengaged without disturbing the original feed setting. An adjustable safety friction leather washer in the clutch mechanism prohibits damaging any portion of the mechanism engaged. The clutch control is sensitive and practically any amount of travel can be had.

Adjustments by hand to the spindle saddle, spindle travel or movement, table saddle or table are provided in addition to the automatic feeds. All screws being fitted with graduated dials reading in thousandths of an inch, interchangeable work is assured and accuracy throughout obtained.

Single friction clutch pulley drive operating at constant speed is regularly furnished. Constant speed or adjustable speed motor drive is furnished when required at extra prices. The manufacturers are prepared to equip their machines with any type of electrical control, manual or automatic push button.

STARRETT BOOK IN ITS FOURTH EDITION

The fourth edition of the Starrett Book for Machinists' Apprentices, published by the L. S. Starrett Co., of Athol, Mass., has just been issued. The book, now in its thirty-fifth thousand, is a well illustrated volume of 176 pages, bound in red Athol leather and designed to answer in an authoritative manner questions as to how to do the every-day work of the average machine shop. The different classes of work are taken up separately, the most common errors pointed out and the correct practice indicated. Much attention is given to the proper use and care of tools, the reading of micrometers and verniers, bench work, lathes and lathe tools, grinding, belts, gears, etc. The book is essentially for the apprentice rather than the expert machinist, though the latter will find much of interest and value, and is intended to provide the answers to the many questions usually asked of the foreman or superintendent. Distribution is being made exclusively through the hardware dealers handling the Starrett line of tools, the price being 50 cents per copy. The briefest examination of the volume will convince the ambitious apprentice or machinist of its value in his every-day work.

ROLLING CONCRETE REINFORCEMENT FROM OLD RAILS

Continued from page 61

his rolls. The size of the concrete bar made is 1 inch, that being the average size of metal that is mostly used for reinforcing concrete work, although there are other sizes made to suit the requirements for different classes of concrete construction. Some bars are twisted while the metal is hot, and others have protruding knobs of metal on their sides. The latter are made by a machine which cuts out hollow places in the square roll passes; this is done after the roll grooves are turned.

When the metal is rolled in the finishing square grooves, it flows into the hollow spots, thus forming knobs on the surface of the bars. Reinforcing metal with either twisted or knob surfaces are used to hold tighter to the concrete than the plain bars will do, some contractors preferring one or the other styles according to which they consider the best.

When bars are embedded in concrete for any length of time and the structure is torn down, it has been found out by experience that the reinforcing bars were in good condition; the only difference noted was, that the outside surfaces of the bars were perfectly bright as if the metal had been put into a buffing and polishing lathe; this de-rusting of the bars is probably due to the action of the chemicals in the concrete in dissolving the outer coating of oxide of iron and rust at the moment that the concrete hardens, and then stops, as the interior of the metal is not affected.

Old rail steel, when made into square, flat bars and angles, is also suitable for quite a variety of uses, as owing to its high elastic limit and high tensile strength, it will give good satisfaction to the users.

The MacLean Publishing Company
LIMITED
(ESTABLISHED 1888)
JOHN BAYNE MACLEAN, President H. T. HUNTER, Vice-President
H. V. TYRRELL, General Manager
PUBLISHERS OF

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.
B. G. NEWTON, Manager. A. R. KENNEDY, Man. Editor.
Associate Editors:
W. F. SUTHERLAND T. H. FENNER J. H. RODGERS (Montreal)

Office of Publication, 143-153 University Avenue, Toronto, Ontario.

Vol. XXI. JANUARY 16, 1919 No. 3

Soldier Training and Civilian Life

HAS military experience made a man more or less fit for the civil life to which he must now turn? Col. Lorne Mulloy, the blinded veteran of the Boer War, sized this situation up well at a meeting in Brantford a few days ago.

Ordinarily, a man judges, decides, and acts in regard to when he shall go to bed, when he shall rise, when or whether he shall shave, shine his shoes, eat his breakfast, wear his overcoat, and all the multiplicity of acts that constitute a day. Self-interest drives him to work in the morning and keeps him there till quitting time; self-interest and responsibility make him provide for food, clothes and shelter, and whatever comforts his state in society expects for himself and those dependent on him.

In the army, on the other hand, all is already decided for him. He does not get up when he elects—the bugle wakes him; he has to shave and shine up; he eats when the rest of the parade eats; he is told "'A' company will parade with greatcoats"; even his pay is unnecessary to his comfort—he could waste it all and he would still be clothed, fed, sheltered, and given medical care.

From the moment the soldier dons his uniform he is relieved of all the responsibility, the "urge" that makes for success in civil life. If he worried about his keep in the army he would be as foolish as the reader would be if he worried about the supply of air.

Now, take the uniform off, and the individual feels much like a heavy draught horse with a heavy load, tugging it up a hill would, should the bridle suddenly be snatched off. He is nonplussed. He is used to being directed. He cannot feel his responsibility for his keep; his three years of training have almost erased that from his thoughts. He cannot at once exercise his initiative; he has been taught for three years to act just so and not otherwise. He is not actuated by the self-interest that impels the citizen to work. If his self-interest had been exercised for the last three years, how long would he have drilled in the snow, tramped in the heat, or stood, with freezing fingers gripping his rifle, as he stood to his waist in the frozen slime of Flanders? He is released from the extraneous spur of military life, and the inner spur of ambition and self-interest has not yet begun to function.

Against this, it can be held that the men who went to the front are those possessed of a high degree of courage and determination. They are men who won every decoration known from the V.C. down. They saw the great need and they realized the great danger, and they were big enough to rise to the occasion.

For the time they may need a little more latitude than formerly. Surely it is not asking too much to suggest that this should be extended to them?

It is not fair that a returned man should be expected to be 100 per cent. efficient the first day he starts work after two or three years in the army.

Returned Soldiers Are No Menace

SO much is heard of the returned soldier that it might be imagined he was not a welcome comer to this country.

Some of our pessimists, when they look at the numbers that are being let out by the munitions works, are fond of throwing up their hands and saying, "And just think of all the returned soldiers that will be around looking for something to do."

One might almost imagine, to hear these croakers, that they wished the war might have continued indefinitely in order that there might be no such thing as the returning soldier to deal with.

Or else another guess might be that matters were becoming so serious that for every soldier returning home a civilian from the same community should go down and jump in the lake, in order to keep the balance of people and jobs unruffled.

Canada was mightily interested in these soldiers when they enlisted. She was mightily interested in them when they were holding that Western line that looked for all the world time and again as though it were going to break, and Canada is mightily interested in these men right now, and wants to put them back into civil life just as quickly and comfortably as possible.

The army that went from this country was not an army of professional soldiers. The army will not remain in the uniform. The men in it will cease to be soldiers just now as soon as they can be brought back and returned to civil life.

This returned soldier talk is being carried in some stages to a point where it might appear to be proper to refer to it as the "returned soldier menace."

For the great majority these are our own men. They are coming back to their own land. They are returning to a country that is well able to look after them—to a place that urged them to enlist and cheered them when they did so. There are some of them that war has used badly. These men are not on the charity of the country. They have paid the price almost to the limit, and every cent they get in the way of pension is a wage dearly purchased.

This army that is coming back is not an army of invasion. They are our own men. Fathers, brothers, sons, husbands of families that have always lived here. It would be well for some of the folks that speak with long faces of the returning soldier problem, to get this drift well imbedded in their mental vision.

AN expert is one who tells others how to do things that he'd make an awful mess out of if he'd tackle it himself.

THE Ontario Government is going to open up more territory for fishing. All of which points to the need of making sure of a good crop of fishworms and corkscrews.

THERE was a drop in the pork market this week. Pigs with their boots on went down $3 per hundred. All of which means that there will be a squeal from the farm, but not necessarily from the barnyard end of it.

THE German Junkers sowed the seeds of anarchy in Russia. The stuff sprouted, grew and went to seed, and the seed blew and found root in Germany. It's just the old story of sowing the wind and reaping the whirlwind, but in this case they sowed the Bolshevik and are gathering the Spartacans.

FORTY-THREE YEARS A MACHINIST FOR C.G.R.

Long Record of Faithful Service—Mr. Sand's Connection With Moncton Shops.

IN point of service, W. T. Sands is the "oldest" man in the Canadian National Railway (C.G.R.) machine shops, at Moncton, N.B. He has been continuously employed as a machinist in the C.G.R. shops since June 1, 1876—a period of nearly 43 years.

W. T. SANDS

The accompanying picture of Mr. Sands, which is a good likeness of him, as he is to-day, suggests that he must have jumped directly from swaddling clothes into machinist's overalls. As a matter of fact, Mr. Sands celebrated his sixty-fourth birthday last Christmas. He was born at St. Martin's, N.B., Dec. 25, 1854. Whether it be due to this auspicious circumstance, or to the choice of a nuptial day exactly twenty-four years later, Mr. Sands seems to have got more than a glimpse of the secret of youth. The discrepancy between his appearance and Father Time's records, Mr. Sands says, is due to the temperate habits he has practised, and the steady work he has done since boyhood.

Besides having been a faithful servant of the nation for more than forty years, Mr. Sands has played the part of a good and useful citizen of the city of his adoption, and to-day commands the highest respect not only of his fellow-employees, but of Monctonians generally.

Where You Can Make Money

THERE was a good mechanic in a shop not far from Toronto. He was a tool maker, and took a keen interest in his work. In fact, he was rather proud of the fact that he was a good tool maker.

He read in the columns of CANADIAN MACHINERY that the paper would pay for some of his experiences and ideas, and he tried it out.

He went over his records, looked into the charts and formulas that he had used at various times—for he kept careful record of them all. It was not a very hard matter to pick on several items that he thought other mechanics would like to read about, and he kept in view those things that had been of some real assistance to him in his work.

And so he started at it. He sent in his stuff and he sent along with it a sketch, well drawn—for he is a good draftsman—and waited to hear from the paper.

In a few days he got a letter. It stated that his stuff was what the paper wanted, and it would be used as soon as the sketch could be made into a cut for printing purposes.

He had done the writing and the sketching in an evening at home. Doing it had brought back to his mind very clearly all the details in connection with the work, and in this way he was a better man himself when he went back to work the following day.

It was the middle of the next month before he got his payment. It amounted to $4.50. Not much, perhaps, but it was a start. It more than paid for his paper for a year, and it gave him the certain knowledge that where he had made $4.50 for an idea in print he could make another $4.50 and so on.

It wasn't long before he spent another evening at home at this work. He had gained the "drift" of what the paper wanted to print. He began to see that there was more in it than the money he could get out of it. He was gaining greater confidence in himself, and he was finding that the commonplace was being removed from his work.

Can you duplicate the performance of this tool maker? Can you put in writing some experience, some production method, some shop kink that has helped you? Can you send along with it a little sketch so that the idea will get all the way across to those who read it? If you can, and will, you can open up to yourself a nice little field for making money.

CANADIAN MACHINERY will give every consideration to matter you may care to contribute. Have in mind the new work that will have to be performed in the machine shops of the Dominion when it may be necessary to resort to quantity production. If your sketching is not done in style to make it fit for reproduction, we have men on the staff whose business it is to draw perfectly before the matter goes in the paper, so do not hesitate on that account.

CANADIAN MACHINERY wants your contributions, and you will be a bigger and a better man for the effort.

Speakin' of Winter

THERE'S heaps of folks what versify about the summer time, and set their thoughts to prosy word or else to jinglin' rhyme. They tear off yards about the birds, about the skies and flowers, and throw themselves clear out of joint about the sunny hours.

And then there's others what will take and dip the quill in ink, to show that summer season puts people on the blink.

They spread 'emselves to show, by heck, the beauties of the spring, of bustin' buds and slush and mud, of them there things they sing—about the birds a-comin' home and fixin' up their house, and sittin' on the strawstack and shoutin' for a spouse.

Of course some others much prefer the days when autumn comes, and fall fairs beckon to the spuds, the punkins and the plums.

There aint no rule, it seems to me, to make folks think alike, nor nothin' much to tell a chap which way they're goin' to strike.

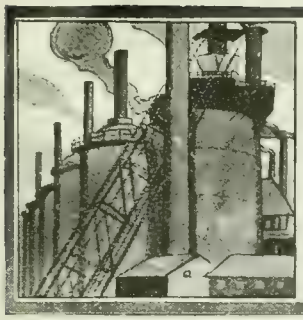
But here's a word for winter time, the days for you and me, let's hatch a toast unto the thing and drink it in cold tea. We've heard from poets heaps of times about the ice and snow, of the robins pullin' on his socks whene'er the north winds blow—and heaps of stuff's been writ in verse 'bout ridin' in a sleigh, with yer feet upon a heated brick beneath a wisp of hay.

Of course them things is right and good and pleasin' to the eye, and it's right to speak and notice them as they go flittin' by. But there's one thing that brings the tears a-spoutin' to my lashes—when father hits the cellar stairs and starts to sift the ashes.—ARK.

A U.S. SENATOR is out with the suggestion that the Kaiser be hanged. If he'd only came out and had his idea put across about five years ago he'd have saved this world getting mixed up in an awful mess.

* * *

IT IS being suggested that the Prince of Wales should get a wife in the States, as the stock of princesses is running short in Europe. Well, why not let the chap get out and hustle and find a wife for himself?



MARKET DEVELOPMENTS

New Price Did Not Govern First Big Order

Plate For Boiler Construction Placed at Figure Above the U.S. Fixed Figure For Last Quarter—Dealers Satisfied That Good Business is Ahead After Adjustment

THERE seems to be a tendency in some very well informed quarters to think that the U.S. Steel Corporation was rather premature in announcing a reduction in prices which included a three-cent base price for plate. To show that it does not control the situation it is worth noting that he biggest plate order sent from Canada since the war ceased was placed inside the last week or so at a base price of 3.75, which is well in advance not only of the Corporation cut price, but of the fixed price of 3.25 that ruled during the life of the U.S. War Industries Board. Certain it is that the three-cent price has not stimulated business.

Other lines continue to make concessions in prices. Sheets, for instance, are at a seven-cent mark from the warehouses. Sheet mills, both in U.S. and Canada, are out looking for business. Many mills were taken off sheets during the war, and are now returning from the rolling of plate or other war material. Their books are empty and any business offering is keenly pursued. The tube situation also shows a tendency to weaken, although form of voluntary action on the part of the dealers, be- it must be said that these reductions are more in the cause the stocks all over Canada and the States are still very low and it will take a considerable time to replenish them.

Dealers in machine tools report some enquiries that will mean immediate business, and they are all satisfied that there is a good turnover not far ahead. The making of adjustments with the U.S. Government following the cancellation of war contracts is going to take up considerable time, and this work has hardly been brought under way yet. It seems likely that the office for attending to this work will be located in Toronto, as that place is the logical centre for the majority of the shell shops that have been handling these orders.

The scrap metal market remains disorganized and stagnant. There are no sales being made. Sellers who have any material feel inclined to hold out for better terms, but dealers at present are well stocked and are not inclined to raise the rather low levels to which they have recently marked the price list.

THERE IS NOT A LARGE VOLUME OF BUSINESS MOVING IN MONTREAL

Special to CANADIAN MACHINERY

MONTREAL, Jan. 13.—Inquiry at different sources fails to develop any concentrated action regarding plans for reconstruction, but a certain undertone of early activity seems to pervade the general situation. A recently returned officer from France stated to CANADIAN MACHINERY that big business would soon materialize in European countries and that Canada would share in no small measure in this reborn activity. Many of the metal-working plants in this district are closed, or operating with reduced forces, but no feeling of unrest appears evident.

Even labor seems to recognize the future possibilities of extensive development and are apparently resigned to a brief period of unemployment. Business in this district has shown a slightly better tone during the week and prospects are generally encouraging.

Slight Improvement in Steel

Gradual readjustment to more normal price conditions has created a cautious attitude on the part of the buyers and purchases are seldom made on a large scale, the tendency apparently being to cover their immediate requirements only, with the feeling that the near future will see still further moderation in general price conditions. While the past few weeks have not been marked with any pronounced activity, due to many obvious reasons, present indications point to a slight renewal of optimism, as dealers here report better inquiry and demand for some domestic steels. Plates and structural shapes are moving a little more freely. Considerable uncertainty is still shown throughout the trade, and this is clearly illustrated in the effort to find out what the other fellow is doing, or going to do. Everything appears to hinge on the possibility of good business developing as a result of the efforts of those now active in Europe. That such trade will materialize is generally conceded, but the volume is still more or less a question of doubt, and until some tangible development takes place, the reluctant spirit will still feature the resumption of activity. The local steel mills are still busy, but operating below capacity. Cancellations are not heavy, but in some instances concessions are being made. Dealers here are now asking 7 cents for ¼-inch plates and 7½ cents for 3-16-inch up.

No. 10 black sheets are now quoted at 8 cents, instead of the 10 cent price ruling for the latter part of 1918.

It is expected that boiler tubes will be adjusted to a lower price level very soon, even though the demand is still heavy.

With the cessation of shell-making activity it was quite natural to expect a falling off in the demand for high speed steel, and the market in this connection is a quiet one at present. Some dealers here are reported to be sacrificing their stocks, but the nominal quotation is still high, the reason being the relative cost of labor and raw materials. The average quotation at the present time ranges from $1.75 to $2.00 per lb.

No Activity in Metals

Apart from the quiet tone that has emphasized the metal markets for the

past few weeks there is little to report. Some little business is being done, but features are entirely absent. The general demand for copper is poor, and, according to reports, the smelters and refineries are operating at low pressure. Quotations here are unsteady at 26 and 27 cents per lb. Tin is comparatively quiet and sales are invariably on small lots; prices are nominal at 75 cents per lb. Lead is in fair demand and quotations are firm at 9 cents per lb. Spelter is inactive and quotations range from 9¼ to 9½ cents per lb. Aluminum is quiet, but demand is fairly steady and price is maintained at 43 cents per lb

Quiet in Machine Tools

There is little to report in connection with the machine tool business. There is no pronounced activity in any direction and trading is generally quiet. Some business has been done in second-hand shell machinery, but this is on equipment that can readily be adapted to general purpose work. In this field, like that of most others, there is the feeling that early developments will result in a revival of machine tool demand, but without definite assurance, a waiting attitude appears to feature what little business is being done. Another factor that is apparently delaying a more general buying of tools is the possibility of a return to more normal prices in the matter of the cost of finished machines. At present the quotations are governed largely by the prevailing high cost of labor and raw materials; this, however, is steadily being adjusted to meet the rising conditions. Dealers report a fairly steady demand for tools for railroad use and of late the demand for rock drills has shown an increase. Road work and canal extensions on the part of the Government is probably responsible for this activity.

Lower Prices No Inducement

Lower levels in scrap have had no material affect upon the market and the situation remains one of virtual stagnation, with little activity reported anywhere. Many large consumers were well stocked when operations were suddenly suspended, and until this material is absorbed heavy buying is not expected. Dealers here report that a great deal of the shell scrap is being bought up by the American mills, but the volume of this class of scrap, in this district, is still considerable. Small quantities of foundry scrap is the only active business at the present. Both dealers and consumers are waiting for further developments and little buying is expected on the declining market. In general the quotations this week are lower than last, but crucible copper is 1½ cents higher than previously quoted. Scrap aluminum has advanced from 16 to 18 cents, this week's price. Heavy melting steel and old boiler plate have both declined $5 per ton, the quotations being $15 and $16 respectively. Rails at $20 shows a drop of $6 per ton. Car wheels are now quoted at $25 to $30 per ton, against the previous price of $38. Stove plate has declined from $22 to $16 per ton. Scrap zinc at 5½ cents, heavy lead at 5½ cents, and tea lead at 4½ cents, represent a drop of from ½ to 1 cent per lb.

POINTS IN WEEK'S MARKETING NOTES

Orders have been placed in Canada for seventy-six boilers for Fabricated Ship Corporation. Plate for over fifty of these has been ordered, the base price being not the new 3 cent. price, but 3.75, which is even higher than the fixed price which has ruled during the war.

—

Prices of boiler tubes show signs of coming down a little. Just how far this tendency will develop is hard to say, as there is not a very large stock in either Canada or United States.

—

The Canadian Government railways are sending out specifications for considerable business in the way of supplies for the railway shops.

—

The making of adjustments between the U.S. Government and Canadian shell shops whose contracts were cancelled, will begin shortly. It is expected that a considerable time will be necessary to get these matters adjusted satisfactorily as very large sums are involved, and work at all stages will have to be considered.

—

There are practically no sales being made in the scrap metal trade. Sellers have not reconciled themselves to the lower levels that dealers are insisting upon, and dealers are stocked now without buying material for which they have no disposition in sight.

ONLY CORPORATION HAS 3c PLATE PRICE

Big Business Placed From Canada Recently Has Been On a 3.75 Base Price

TORONTO. — There is nothing now approaching the volume of business that was passing through the machine tool and supply houses a few months ago. For a long time it was war work, and still more war work, and when this is cut off it is only natural to suppose that there should be a big drop. Recovery can be said to have started. Several dealers report that they have made sales during the week, and in each case it has been a nice new machine that has figured in the deal. Developments are being held up to some extent by reason of the delays that seem to be necessary in connection with the presentation and consideration of claims from manufacturers whose munitions contracts were cancelled at the signing of the armistice.

It becomes evident that it cannot be regarded that 3c is the base price for steel plate at U.S. points, as mills outside the Corporation are not down to that figure.

Some Business Offering

Machine tool dealers are satisfied that there is going to be some good business in store for them. They hold that the first four months of 1919 will be required for the manufacturers who have been working on munitions to get straightened away and arrange regarding the making of adjustments. Only a little work is being carried on yet in the manufacture of U.S. orders. Fuses will be through by the end of the month, and it will mean that another thousand or so munitions workers, mostly women, will be dismissed in Toronto. When fuse making is ended there will not be much left in the way of war material to provide employment. The Adjustment Board has been named, but very little work has been done. There is a lot of detail in connection with the cases with which they will have to deal, and it will be some time before it is all cleared up.

The Canadian Government railways is asking for specification and prices on a nice list of supplies this week, and there is some business offering in connection with the marine department.

Corporation Stands Alone

Apparently it is a mistake to take it for granted that three cents is the base price for steel plate at all American points. The Steel Corporation stand alone with this price. A representative of a large United States mill, who was in Toronto this week, when speaking of this matter to CANADIAN MACHINERY contended that the action of the Steel Corporation in rushing in with a price lower than the level fixed during the war had served no good purpose. "It has not brought in any extra business, and these independent rollers are not following. They are not originating any more business at the three-cent rate than they might have done had they stated that their base price was one cent per pound. Steel cannot be produced at their figure at present charges in U.S. mills."

There seems to be evidence coming up that contracts placed for plate for Canadian users are not going at the 3c rate. For instance, the contracts for the ships being ordered through the Fabricated Ship Co., for French delivery, will have to provide for 76 boilers. Orders for the material for at least 50 of these has already been placed and not at the three-cent rate. In fact, CANADIAN MACHINERY learns that the base price for the plate in these boilers was at a figure of 3.75 f.o.b. U.S. mills. It is also stated that the Corporation that has the three-cent base charge now has no definite shipping date. That was one of the things insisted upon in the contract referred to above, and the firms handling the business were able to agree to that part of the contract. There were

only three mills in the U.S. that could make delivery on the quality and size of plate required and together with that give a promise of actual delivery at a specified time.

The price of sheets is much easier. If one were to look for the reason it would not take long to come to the conclusion that it is because mills are out looking for business. The dropping market can hardly be laid to the warehouse men, as there is not a large stock of sheets in the country. At the same time the production is coming back very rapidly. There had been many mills that had been ordered by Washington to roll plate and other material and now that the Government control is removed and they are returning to old lines the production of plate is coming back to large amounts very quickly.

It is supposed that the books of most of the bills an either side of the line are pretty well cleared up on the plate proposition now.

Tubes Are Weaker

The reductions that have taken place in the price of tubes appear to be voluntary on the part of some of the sellers. There are no large stocks on hand either here or across the line. In fact there are some sizes that are not represented yet. There has been for some weeks past an unusually heavy demand for tubes, and this tends to keep the stock on hand at a low mark. Instead of the old tube list standing with ten per cent. off a new list was handed out to-day, making 4-inch tubes $67 against a former $75. It may be that still lower prices will come in tubes, for they are still a long way ahead of the pre-war prices. In Canada when the war broke out four-inch tubes were quoted at 18c against the 67c, or the 75c, which has been standing for some time. It is doubtful if even after the lapse of time and much readjusting prices will ever come down to the 18c. In November of 1915 the price had risen to 22c. After that the rise in price amounted to a real procession, and it was an unbroken succession of increases covering the period between them and the end of the war.

Market Still Stagnant

Last week a new list of scrap metals was announced, and in it some very severe cuts were made in the prices that dealers would pay. The list was not put out with the idea of stimulating trade, for an announcement that prices dealers will pay have been cut to pieces is hardly calculated to help matters this way. A leading Toronto dealer when asked if anything was coming in at the new low levels said, "There is practically no business going on at present. Many of the yards are going over their business for the year. As a matter of fact we do not want to buy and sellers do not seem anxious to dispose of their holdings at present rates. I can't see where there is anything in the immediate future that is going to improve matters much either. For all practical purposes we are simply sitting on the fence at the present time."

U. S. STEEL MILLS DO NOT FIND ANY TENDENCY OF BUYERS TO STOCK UP

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Jan. 16. — Pig iron production in the United States in December was at the rate of about 40,800,000 gross tons a year, showing a decrease of a trifle less than one per cent. from the November rate and a decline of slightly less than three per cent. from the maximum rate on record, which was attained in September. The year's production was about 38,900,000 tons, against 38,647,397 tons in 1917 and 39,434,797 tons in 1916, the record year.

Production in 1918 was at about 12 per cent. under the average capacity for the year, the losses in production being due to the railroad breakdown last winter, occasional shortages of coke later, poor quality of coke furnished, a little labor shortage, and a considerable shortage of the classes of scrap usually used in blast furnaces to swell output.

The present blast furnace capacity is about 45,000,000 tons. There has been a sharp increase in capacity since the war started. No new furnaces were completed in 1914, and only three in 1915 and four in 1916, but in 1917 no less than 14 new stacks were completed and blown in and for 1918 the count was eight stacks. There are seven stacks now in course of erection or definitely projected, which would add considerably more than a million tons to the capacity.

Production of steel ingots in December was at the rate of 43,750,000 gross tons a year, against a rate shown for November of 43,000,000 tons a year. The maximum rate attained was in September last, at the rate of 46 800,000 tons per year.

Steel ingot production in 1918 amounted to about 42,200,000 tons, against 43,700,000 tons in 1917 and 41,400,000 tons in 1916. As was the case in pig iron, the steel ingot output in 1918 was considerably below the capacity, which averaged during the year about 48.000,000 tons. Capacity at present is about 49,000,000 tons, and there is about 1,000,000 tons capacity involved in new construction now in progress.

Some blast furnacemen, also some scrap dealers, are attempting to argue just now that building of new steel capacity has outrun blast furnace construction, so that if there were such demand for steel as to call for all steel making capacity to be operated there would not be enough pig iron to go around. This is not correct. A careful analysis of the whole situation indicates that the balance between pig iron capacity and steel capacity is the same as was shown by the actual production in 1916, and in that year no steel works suffered from lack of pig iron. That is, if the production of steel making pig iron bore to the 49.000,000 ton steel ingot capacity the same proportion as obtained in 1916 there would be left, out of a 45,000.000 ton production of pig iron, about 7,000.000 tons of foundry and other grades not used by steel works. Furthermore, the United States in 1916 exported about 600,000 tons of pig iron and about 200,000 tons of scrap. Assuming that the steel works undertook to operate at capacity, they would be able to get a supply of pig iron and scrap, but there would be in addition a margin of safety in the cutting off of exports of pig iron and scrap.

Mill Operations Light

The rate of steel production in December was surprisingly heavy, in view of the lightness of demand. Apparently the mills made every effort to ship promptly against orders on books, for fear customers would ask for postponements. The average steel consumer probably did not realize, immediately upon the signing of the armistice, how plentiful steel was going to become. The matter is well understood now, and by as much as steel was shipped freely in December, the requirements of buyers are now diminished. Some estimates place steel mill operations last week at as low as 65 per cent. of capacity, and while this seems like a tremendous change for an industry that only two months ago was straining every nerve to get out the last ton possible of output, it is really suggestive of a high rate of production, for 65 per cent. production out of the present capacity would mean 40 per cent more tonnage than was produced in 1906, and it is well recalled that the demand that year was regarded as almost unprecedentedly heavy. There was enormous demand for rails, with a heavier output than attained in any other year, before or since, and large quantities of steel were used for building freight cars and locomotives. Now there are hardly any rails being rolled and only a very few tens of thousands of freight cars are still to be built, on old orders, while there is no move to place additional orders. Also, there is scarcely any new construction outside the railroads, and manufacturing consumers generally are operating at rather light rates, except the automobile industry, which is making every effort to turn out a maximum number of cars every week, wtih promise of a very full demand for an indefinite time to come. The automobile industry, however, is physically unable to consume steel equal to more than two or three per cent. of the total steel making capacity. Jobbers are buying very sparingly. Their orders are urgent, in that when they do buy they want the quickest possible delivery, as they are afraid as to prices. There is no disposition on the part of either jobbers or manufacturing consumers to buy ahead.

In the circumstances the likelihood is that steel mill operations will continue to decrease for some time to come, perhaps to a rate below 50 per cent. of capacity. Some additional demand will

doubtless develop with spring, but the heavy demand, the demand that is universally expected to keep the steel industry busy and prosperous for a period of years, perhaps five, is still in the uncertain future. Steel producers are as diffident about making predictions as to when this demand will start as they are bold in asserting that some time it will come.

Prices

Pig iron and steel prices are under no pressure. The market all along the line is well defined and producers will not budge from the recognized prices. There are no offers to buy any considerable tonnages at slight cuts from existing quotations and thus there is no incentive to cut. Producers have large quantities of material sold under contract and with a steady market they expect buyers to take more material than could possibly be sold by cutting prices. Hence it is easy for the market to stay steady.

Steel Corporation Figures

The Steel Corporation reports its unfilled tonnage at the close of business December 31 at 7,379,152 tons, or 745,511 tons less than at the beginning of December. This statement is altogether a puzzle. Shipments during December were probably about 1,100,000 tons, and if there were bookings on new business equal to 350,000 tons that is all that could be expected, recalling how very dull the market was during the month. That would strike a balance in one respect, but it would leave nothing for the cancellations of war steel contracts that had to follow the sudden ending of the war. How these cancellations could avoid getting into the records before the end of December is not understood. One may speculate, of course, that the war steel business had not been entered as unfilled tonnage originally, but it would be equally difficult to explain why such an omission occurred.

SOME DOUBT ABOUT U.S. IRON PRICE NOW

Makers Don't Want Business Based On Any Loan Price Conditions.

SALES of pig iron that are passing this week are not large. There apparently is some doubt as to whether $31 or $34 is the base price at U.S. points.

Chicago.—A number of contracts were made for first half delivery at $34, and one of the most difficult questions now is what to make of these contracts.

Cleveland. — Invoices are being sent along by producers with shipments that were booked for first quarter delivery at $34 per ton, and cancellations are not entertained.

Pittsburg. — Small lots of iron are being sold, but mostly for some specific purpose. The new price is being recognized and immediate shipment is asked for in every case. Sales are not going over 500 or 700 tons.

New York.—Enquiries are being made more freely than for some weeks. The actual tonnage is not large. The market looks as though it were going to become steady on a basis of $3 under the fourth quarter schedule.

Buffalo.—There is a decided tone of betterment noted in market conditions here. One furnace says it is sold up to a point where it can only care for regular customers by giving them their wants piecemeal.

Cincinnati.—Furnaces seem to be well filled with orders and will not consider taking on business at a low-price contract.

THE SCRAP MARKET IS ABOUT AS DEAD AS COULD BE IMAGINED

STAGNATION describes the condition in the scrap trade at present. Neither buyers nor sellers are in the market. Sellers do not want to make the sacrifice necessary to get buyers to consider their stocks, and buyers will not pay the price that will induce a none too insistent seller to part with his material. Reports from some of the U.S. points are as follows:—

Chicago. — There is comparatively little new buying going on here. Here and there a consumer comes out to buy at present quotations, but the total tonnage passing in these sales does not amount to very much. Dealers in some cases find that they are coming out at the small end of the deal through cancellations. They filled orders and lost money in 1917 by so doing, and the same thing is taking place now by reason of consumers refusing to pay prices it has cost them to secure material under contract.

New York.—It looks as though consumers and dealers were united on one point, and that is to stand back and wait for prices to settle somewhere. Figures quoted are simply nominal, but the trend is undoubtedly downward. Canadian munitions makers are offering about 20,000 tons of shell steel, but up to the present there have been no takers for the lot.

Pittsburgh.—The prices of scrap are on the toboggan in this district. There is a very limited demand and no stabilizing influence has made itself felt. Heavy melting is as low as $20. There is a large amount of shell scrap offering, although the amounts from Canada are decreasing owing to Government regulations.

Cleveland.—Present needs is the limit for any buying that is being done here. As low as $15 has been paid and accepted for heavy melting, although the average runs above that.

Buffalo.—It begins to look as though the bottom has been reached in the scrap market. Scrap from Canadian shell shops that were working on U.S. orders is being stored at three plants here.

Cincinnati. — Top ends of shrapnel rounds are coming back on the market in fairly large quantities. A number of cancellations that are being insisted upon help to keep the market in an unsettled condition.

St. Louis.—Inactive describes the conditions in the market here. The actual business that is passing does not amount to much. Even at the new prices that have been announced no business is being done, as buyers do not seem to consider coming into the market at any price. Railroads are holding their lists until higher prices are obtainable.

SEVERAL CHANGES DURING THE YEAR

Promotions to Many at Plant of Dominion Steel Corporation

During the war several important changes occurred in the staffs of the Coal and Steel Companies, says the Sydney, N.S., "Daily Post."

D. H. McDougall, who had been general manager of the Dominion Coal Company since 1912 and of the Dominion Iron and Steel Company since 1916, resigned both offices to become president of the Nova Scotia Steel and Coal Company. No successor has been appointed.

R. F. Randolph, who had been general superintendent of the Dominion Iron and Steel Company since 1916, retired from that office in October and was succeeded by H. E. Rice, previously assistant general superintendent. About the same time G. D. McDougall, chief engineer, resigned that office to become general superintendent of the Nova Scotia Steel & Coal Company. No successor has been appointed. On 1st of December Wm. H. Graham was appointed superintendent of construction at the Dominion Steel Works, and J. H. Fraser was transferred from assistant master mechanic to assistant superintendent of construction. Early in November, H. D. Townsend was appointed superintendent of Electrical Department in succession to F. L. Collins, who resigned some months earlier and returned to the United States.

W. G. Wilson, who has been appointed superintendent of plate mill, has taken up his duties and will overlook the erection of the mill and the installation of the machinery connected with it.

John S. Whyte, chief mechanical engineer of the Dominion Coal Company, resigned that office to join the staff of the Acadia Coal Company, and his duties were taken over by Vincent McFadden, chief electrician. Following upon movements in the principal works' offices there have been several transfers and promotions which have brought a number of men a step forward.

WHAT TO MAKE

By D. A. H.

That is the question asked in many a shop at the present time. One answer is, a good oil can. Go into any shop or factory and what do we find as the oil can situation? The cans all leaky and worn out.

At present prices for oil, a slight leak will waste the cost of a new can in a couple of days. The only exceptions to the sloppy oil can situation are the oil cans of the stationary engineer, which are but seldom used and might be said to be as ornamental as they are useful.

One shop tried all the cans on the market from the most expensive down to the ten cent variety, and after a two years' test, unhesitatingly adopted the latter. Their report says that either the spout or the joint or the bottom is defective in all classes of cans, and after a few weeks of service at the hands of men who are, to say the least, the best trained to handle "machinery" of any occupation in the world, it is cheaper to throw the cans away than to keep them. As this makes the renewal cost the item of expense, the tin cans are, of course, the cheapest.

The union between the spring bottom and the can body must be so perfect that the natural falls to the floor will not disrupt it. A can spun from one piece would be ideal. The spout should be seamless and integral with the flanged connection to the can proper; the joint between spout and can (if there were any at all) should be a half turn lock of substantial design with a metal-to-metal seat that does away with the slippery stretching gasket. An ideal arrangement would be an entire one-piece construction obtainable by welding or brazing and the use of tubing or formed metal; then if a self-filling device, as with fountain pens, could be incorporated and the can filled through the spout, there would be no threads to wear out in a dozen fillings and consequently no leaking at the base of spouts.

Workmen instinctively neglect and dread to use a can that gets their fingers oily, even though their work is of the kind known as "dirty." If necessary, the oil can could be heavier; no man would object to lifting two pounds instead of one if he could get the advantages named along with the weight. The can which looked most serviceable of all to the writer was a cast can, but the spout joint was defective. If one was made so the spout was cast integral, then drilled out, and a filling boss put on the side that permitted coarse threads half an inch long for a cap with a ground seat—that would be one of the first real cans and the writer is ready to order some at once.

Court Awards $10,000.—The Superior Court, presided over by Justice Maclennan, recently awarded the widow of Emil Primus Hagg, killed last year while at work in the plant of the Canadian Steel Foundries, the sum of $10,000.

NAME AND ADDRESS OF H.R.H. WANTED

In CANADIAN MACHINERY, January 2, there were two short articles published, "Making Twin Screws for Two Jaw Chucks," and "Hints on Cutting Square Threads." These were by H.R.H. Through an error in our records we have lost the proper name and address of H.R.H. We are anxious to secure this information in order that a cheque for the amount due for these may be forwarded.

AEROPLANE MOTORS

Continued from page 58

Thus an engine with a brake horse power of 180 and an indicated horse power of 200 would have a mechanical efficiency of .9. Brake horse power tests of engines are usually made over a range of speeds and by plotting the B.H.P. against the corresponding revolutions per min., a curve is obtained, which shows how the B.H.P. varies with the speed. The type of curve is shown and it will be noted that at first the power rapidly increases with the speed, but that the rate of increase diminishes until the maximum B.H.P. is reached. At higher speeds the power rapidly falls off. The reduction in the rate of growth of the power with speed arises from the rapid increase in the resistance offered by the piping and valves to the inlet and outlet of gases, and also to reduced mechanical efficiency at high speeds. A sketch of a type of brake which has successfully been employed in more than one workshop, and which is worthy of note for its simplicity is shown in Fig. 17. The brake pulley is supported on a shaft running in ball bearings. The ends of the shaft are fitted with a coupling by means of which a short flexible drive can be obtained from the motor to be tested. Two wide brake straps are applied round the very wide pulley and attached to a lever carried by a vertical screw passing through a nut fixed in the cross head at the top of the frame. The loading of the brake is effected by means of weights W., which can be varied as regards position on the lever. When the final adjustment has been made the lever is horizontal the moment $W \times L =$ the force of friction around the circumference of the pulley $\times$ R and

$$B.H.P. = \frac{2 \Pi L N W}{33000}$$

This is, of course, neglecting the horse power, which is also consumed by the brake, which should really be added to the B.H.P. obtained by the above formula.

Water is circulated to keep the pulley cool, centrifugal force ensuring a fairly uniform depth of water around the entire rim.

Before closing, a few brief words on troubles which may arise during the testing of an engine. The easiest method of locating a trouble is by a process of elimination. To an experienced man, the rhythm or hum of an engine, when working, is as the tune of the strings of the violinist, satisfactory when in harmony, but the slightest discord telling him the cause of the trouble behind. Generally speaking, engine troubles may be classified under one of three headings: Carburation, valve timing and ignition, lubrication. Troubles under the first heading will be found to affect the engine in a general manner; that is, the engine suffering from faulty carburation would stop gradually. Ignition troubles have the effect of stopping an engine suddenly. Troubles under the last heading, lubrication, cause overheating, loss of revolutions per minute and the possibility of ultimate cessation.

1. Engine stops suddenly: This is due to failure of the ignition circuit.

2. Engine stops gradually and misfires;
   - (a) Petrol used up.
   - (b) Carburetor choked.
   - (c) Petrol tank air-bound.
   - (d) Sparking plugs fouled.

3. Loss of power, engine continuing to fire regularly;
   - (a) Loss of compression.
   - (b) Faulty mixture.
   - (c) Inefficient lubrication.
   - (d) Incorrect tappet clearance, affecting the lift of the valve.

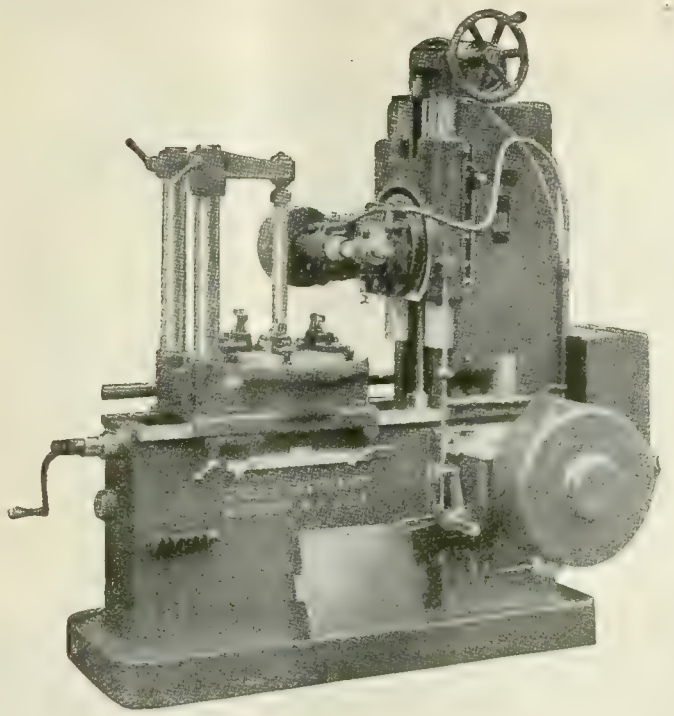
4. Loss of power, engine continuing to fire irregularly;
   - (a) Magneto trouble.
   - (b) Sparking plug or high tension wires damaged.

5. Hissing sounds from the engine;
   - (a) Broken sparking plugs.
   - (b) Leaky joints.
   - (c) Pitted valve seatings.

6. Engine continues to fire after being switched off;
   - (a) Excessive carbon deposit.
   - (b) Switch wired wrongly, keeping engine on permanent contact.

7. Vibration—unbalanced engine;
   - (a) This may be due to a bent crankshaft.
   - (b) Loss of engine fittings.
   - (c) Unbalanced propeller.

Making Adjustments. — The Claims Board is getting organized, but as yet not much work has been done. It seems likely that the offices will be moved to Toronto, which seems to be the logical centre for the works. The members on it are Messrs. Col. O. W. Albee, Maj. Underwood, and one other U.S. officer, Holt Gurney, and H. M. Perry. There is a large amount of work ahead of this body, as they will have to deal with factories in all stages of development, as well as with shops that were producing and have claims for cancelled contracts. It is likely that the work of making settlements and adjustments will keep them busy for at least six months.



Gould & Eberhardt Gear Hobbers

For cutting Spur, Helical and Worm Gears up to 120" dia. Also

Multiple Spindle, Continuous Operation Automatic Roughing Machines for large production.

Put your gear-cutting problems up to us. Catalog on request.

Write for prices and deliveries.

A. R. Williams Machinery Company, Limited

ST. JOHN, MONTREAL
WINNIPEG, VANCOUVER

If It's Machinery, Write Williams"

64 W. FRONT STREET
TORONTO

Steel Castings

Quick Deliveries

We Specialize in

High-Grade Electric Furnace Steel Castings

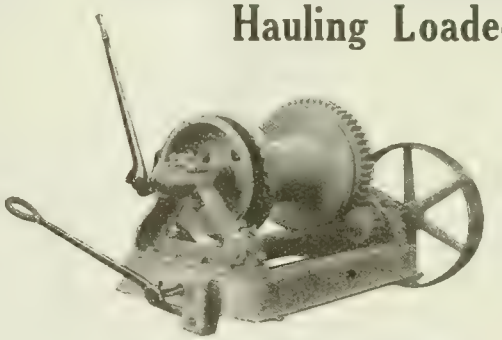
Let us quote for your requirements

The Thos. Davidson Mfg. Co.
Limited

Steel Foundry Division :
Lachine Canal, Que.

Head Office :
187 Delisle St., Montreal

For Hoisting Heavy Materials or Hauling Loaded Cars



Made in 7 Sizes

10 H.P.
15 "
20 "
25 "
32 "
40 "
" 50

Made with two drums also if desired.

We can also supply this Hoist geared for direct connection with an Electric Motor. Let us send you photograph or catalogue.

May we submit a tender on your Castings and Steel Plate Work?

Marsh Engineering Works, Limited

Established 1846

Belleville, Ontario

Sales Agents: **Mussens Limited, Montreal Winnipeg and Vancouver**

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago	37 50
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 27 00	$ 28 00
Electro copper	27 00	28 00
Castings, copper	26 00	26 00
Tin	75 00	78 00
Spelter	9 50	10 00
Lead	9 00	10 00
Antimony	10 00	11 50
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

WROUGHT PIPE

Price List No. 37

Standard Buttweld

	Black	Galvanized
	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	5 22	7 35
⅜ in.	5 22	7 35
½ in.	6 63	8 20
¾ in.	8 40	10 52
1 in.	12 41	15 56
1¼ in.	16 79	21 05
1½ in.	20 08	25 16
2 in.	27 01	33 86
2½ in.	43 29	54 11
3 in.	56 61	70 76
3½ in.	71 76	88 78
4 in.	85 02	105 19

Standard Lapweld

2 in.	31 82	38 30
2½ in.	47 97	58 21
3 in.	52 73	76 12
3½ in.	78 20	96 14
4 in.	92 65	114 00
4½ in.	1 12	1 37
5 in.	1 30	1 59
6 in.	1 69	2 06
7 in.	2 19	2 68
8L in.	2 30	2 81
8 in.	2 65	3 24
9 in.	3 17	3 88
10L in.	2 94	3 60
10 in.	3 79	4 64

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles(wrought iron	30 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	30 00	18 00
Malleable scrap	25 00	15 00
Pipe wrought	18 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent.
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅝ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto ..... net

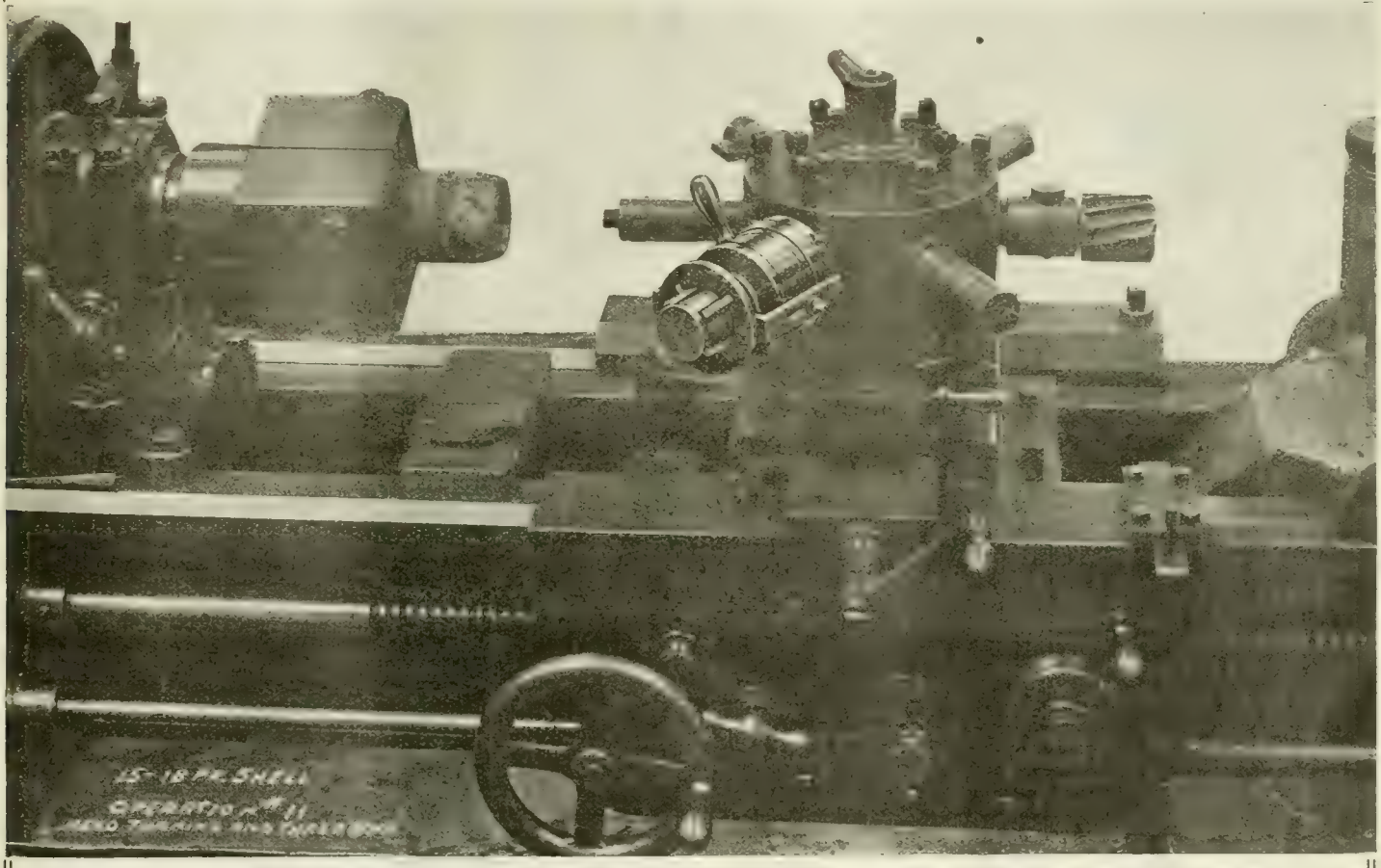
ANOTHER GEOMETRIC FEAT

DESCRIBED IN A LETTER FROM CANADA

Messrs. Geometric Tool Company,
New Haven, Conn., U.S.A.

Gentlemen:—

"The engine lathe shown in the photograph which we are sending you commenced work on shells within four months of the start of the war, when methods were in course of development, and special machines were unknown. Material and labor were both frequently unsatisfactory. Rejections due to poor threads were



frequent troubles with shell makers. Despite many adverse conditions the contract was successfully completed, and the Geometric Tap used on this lathe (fitted to cross-slide on carriage) was an important contributing factor in the good work done in the early strenuous times."

Very truly yours,

Whether yours is a tapping or threading job, or both, you would be satisfied with the Geometric way of doing it.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	8 50
Canada plates, dull, 52 sheets	9 00	8 65
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	9 00
Premier, 10¾ oz.	.....	9 30
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B. ⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ⅛ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE.

White.	Cts. per lb.		
XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers.

Select White.	11	Dark colored.	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

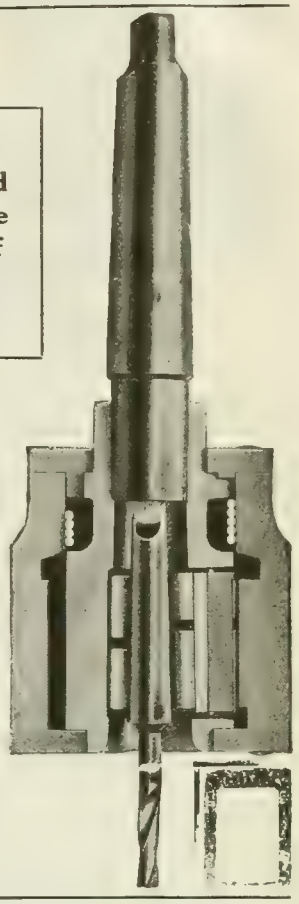
PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

USE Aikenhead's Wahlstrom Chuck

Output Increased 50%—the Result of Minutes Saved



Because this Automatic Chuck will double the output of your drill press while actually lessening the labor of the operator.

This Chuck will save minutes every time a tool is changed, because it self-centers the tool, enabling the operator to remove one drill and insert another in two seconds, without stopping spindle.

This Chuck grips the entire shank of the tool, and the cam action is such that the jaws grip more firmly as resistance on the tool increases. Consequently it holds broken tang tools as well as perfect tools securely. No strain can weaken the grip or cause slippage.

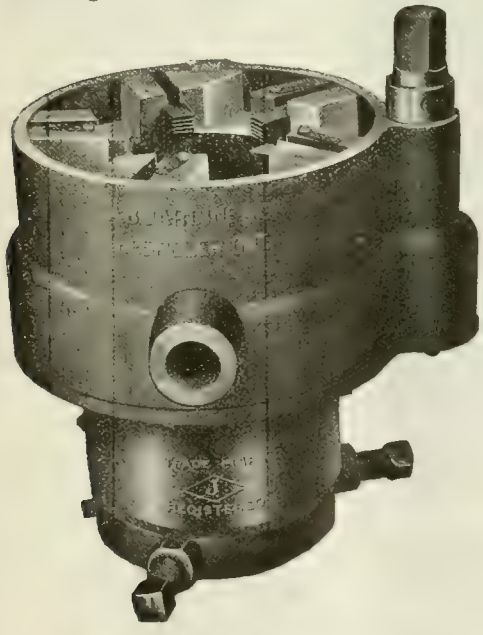
Count the advantages of a Chuck that drills, reams, counterbores and taps without stopping spindle.

Absolutely nothing to get out of order—no collets, no sockets, no keys, no labor.

May we send you Booklet?

Aikenhead Hardware Limited
17 Temperance St. **TORONTO**

Here's what they'll do—



GEARED ADJUSTABLE THREADING TOOL No. 22

Enable One Man to do the Work of Two.

Aikenhead's Jardine
Pipe Threading Tools

In one minute **one man** cuts 2″ pipe; in 8 minutes, 4″ pipe; in 16 minutes, 6″ pipe; in 30 minutes, 8″ pipe.

You'll look a long time before you'll find another pipe threading tool equal this everyday record of Jardine tools.

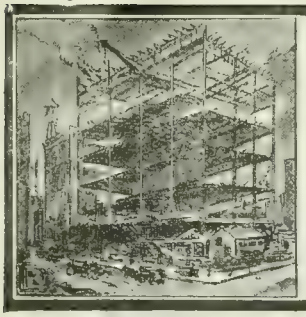
The cutters in Jardine tools cut clean; they don't squeeze. Moreover, they have cutters for each size of pipe. As the tool advances on the pipe, these cutters open out so as to make a proper taper on the thread. The actual cutting is done by the mouth threads of the cutter, the back threads merely steady the tool.

There are more very important facts. Write for them.

GEARED ADJUSTABLE THREADING TOOL NO. 22

Leading screw and gears protected from dirt and chips. Ratchet enables one man to thread 2½″ to 4″ pipe in ditches or positions close to walls or ceilings. Driving cross supplied.

Aikenhead Hardware, Limited
17, 19, 21 Temperance Street, Toronto



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

ENGINEERING

Perth, Ont.—A deputation of Lanark citizens met J. A. Stewart, M.P., to ask his assistance in getting the Canadian National Railway constructed through Perth to Lanark and then on to Arnprior. Messrs. Mackenzie & Mann gave a written promise to construct this line in 1914 previous to the outbreak of war; since then it has been in abeyance.

St. Catharines.—Baldry, Yerburgh and Hutchinson, contractors for section No. 2 Welland ship canal, reopened their office here and will at at once begin the organization of a new staff for a resumption of their section of the work which the Government has authorized after a shutdown of two years. Alex. Grant, formerly of the Trent Valley canal, who succeeds J. L. Weller as chief engineer of the ship canal, was here to-day.

New York.—There was a decrease in the domestic mine output of lead and zinc during the last year. The lead and the recoverable zinc of ores mined were approximately 563,000 tons and 627,000 tons, respectively, as compared with 651,156 tons and 711,192 tons in 1917. The refined lead output of smelters and refineries was 645,000 tons, against 612,214 tons in 1917, and the antimonial lead output was 22,000 tons as against 18,647 tons. The lead available in the United States is 540,000 tons, against 515,258 tons in 1917.

TRADE GOSSIP

Open S K F Office.—The Montreal office of the S K F recently opened at 412 St. James Street under the management of Geo. F. Sheppard is rapidly being remodelled and fitted out with a complete stock of ball bearings, and the various models for demonstrative purposes.

A New Product.—The Tolland Manufacturing Company of Montreal has recently placed on the market a new type of bearing metal, known as "Tomco" special heavy bearing metal. It is especially adapted for rolling mill and paper making machinery and all bearings where heavy pressure is a feature.

Studying Big Problem.—A series of weekly lectures on "Industry, and the Problems of Reconstruction" are being given at the McGill University by Francis Hankin, who has made a special study of the relations of labor and capital from a business standpoint.

In the survey of the present conditions Mr. Hankin emphasized two points: first, the consequence that would likely follow any attempt to adopt a system of repression of any discontent or industrial unrest that might manifest itself in this new era; second, the necessity of treating the workman as more than a cog in the wheel, and that labor shall in future be recognized as the first charge on production. This series of lectures will continue throughout the winter, the first two being free and open to the public, the rest of the course being restricted to those who register.

Damaged by Fire.—The block of motor sales offices on Park Avenue, Montreal, was seriously damaged by fire last week to the extent of about $250,000. The stores affected were the Cadillac Motors, Limited, Just Motors, Dominion Motor Car Co., and Cutten and Foster, and water damage to White Motor Car Co.

Open Labor Offices.—By the establishment of three provincial labor bureaus in Montreal, it is expected that civilian labor will be handled and returned soldiers will be taken care of and helped back to civil occupation. Similar bureaus will be opened in other cities and towns throughout the province. These bureaus will operate in co-operation with postmasters and manufacturers.

Getting the Latest.—As an indication of the extent to which modern equipment is being adopted in New Zealand it is interesting to note that the Volta Mfg. Co., of Welland, are shipping a six-ton electric steel furnace to a firm in Christchurch, New Zealand. Representatives of this firm have made occasional trips to America, with practically the sole purpose of keeping in touch with advanced methods in the steel and iron business.

Big Lumber Purchase.—As the outcome of negotiations carried on by the Canadian Trade Commission for the past month, the timber controller of Great Britain will purchase in Canada half a million standards of lumber, equivalent in the Dominion to one billion square feet. The lumber, which is to be of all grades, will be bought under the direction of the timber controller through British brokerage house and Canadian timber agents in London, who will deal direct with the Canadian lumber producers. The total amount involved is $40,000,000.

Fire Prevention.—At the last regular meeting of the Montreal branch of the Engineering Institute, an illustrated address was given by Geo. H. Greenfield, of the Canadian Car Co., on "Fire Prevention," and the necessity of rigid inspection as an essential factor in the protection of property. The subject was ably dealt with by Mr. Greenfield, and every phase of fire protection and fire fighting was covered, so that little was left for the discussion that followed. From now until the first of May the Montreal branch of the Institute will meet every Thursday evening instead of the fortnightly meeting as formerly.

Where Real Value Is.—At a meeting held in the Central Y.M.C.A. last week, E. W. Beatty, president of the C.P.R., addressed about 250 boys. He impressed on his young hearers the necessity of hard work without which no man got to the top. Education, he said, was essential in the present age, and stated that a man from his shoulders down was worth about $2.50 per day, but from his neck upwards the value was unlimited. Where it is impossible for boys to go to day school, he emphasized the advantage of night study, and although some degree of sacrifice was needed, the education acquired would be fully realized in later years.

Nova Scotia's Output.—Figures on the estimated output of Nova Scotia during the year give the following returns:

Coal	$26,250,000
Coke and by-products	6,150,000
Gold and other minerals	220,000
Gypsum, limestone, etc	825,000
Building materials and clay products	550,000
Iron and steel products	22,400,000
Fisheries	11,650,000
Manufactures, ships and freights	58,340,000
Products of the farm	42,680,314
Products of the forest	5,400,000
Game and furs	500,000
Grand total	$174,965,314

Appoint Committee.—The Council for Scientific and Industrial Research has appointed a sub-committee consisting of Dr. R. F. Ruttan, of McGill University, and Arthur Surveyor, C.E., of Montreal, to confer with the Montreal Board of Trade and Chambre de Commerce in regard to the establishment at Montreal of a bureau of technical and commercial information. While no definite action has yet been taken, the scheme provides for a reference library of scientific, trade

ALGOMA

MARK OF ALGOMA O.H. QUALITY

Structural Steel—Merchant Bars

Blooms, Billets and Slabs

Concrete Reinforcing Bars

Shafting - Pulleys - Hangers

Iron, Brass and Bronze Castings

Steel Rails—*Open Hearth Quality*

All Sections from 12 lbs. to 100 lbs. per yard

Splice Bars

Steel Tie Plates

Sulphate of Ammonia
Sulphuric Acid *Nitre Cake*

PIG IRON

Basic *Foundry* *Bessemer*

ALGOMA STEEL CORPORATION, LIMITED

SAULT STE. MARIE, ONTARIO

and other consular reports, giving to Montreal and Quebec exporters, manufacturers and technologists, constant access to all the latest developments in technical, industrial and commercial activities, foreign credit systems, transportation data, openings for Canadian business abroad, etc.

New Incorporations. — Incorporation has been granted to the following: The C. H. Doerr Co., Limited, Kitchener, capital $250,000; R. Stewart, Son & Cunningham, Limited, Ottawa, capital $50,000; The Bannockburn Clothing Co., Limited, Montreal, capital $50,000; Canadian Government Merchant Marine, Limited, Toronto, capital $1,000,000; Canadian Voyageur, Limited, Toronto, capital $100,000; Canadian Pioneer, Limited, Toronto, capital $100,000; Forhans, Limited, Montreal, capital $100,000; Modern Creamery Company, Limited, Montreal, capital $2,000; Bock & Tetreau, Limited, Montreal, capital $40,000; Canadian Braid & Trimming Co., Limited, Montreal, capital $50,000; The Smart Turner Machine Co., Limited, Hamilton, capital $200 000; Vandeweghe, Limited, Montreal, capital $49,000.

Plants Not Sold.—None of the Munitions Board war plants have as yet been disposed of by Home Smith, in whose care they were entrusted. Mr. Smith says that perhaps in about a fortnight there may be some definite move. Asked if he would dispose of the various plants by auction Mr. Smith said he had not yet decided.

Labor in Montreal.—That the cessation of war munitions activities is resulting in a considerable amount of unemployment and that there are now many skilled and unskilled workers who are unable to procure employment, was the statement made by Mr. Joseph Ainey, director of the Quebec Provincial Labor Bureau. "As far as domestic labor is concerned,' he said, " we have always a call for it, and can place anyone who wants a job, but the industrial market shows a surplus of labor in comparison with the demands."

Seeking Employment.—Increasing difficulty is being experienced in placing men in positions in Toronto and vicinity. There are still large numbers of inquiries for men for manufacturing plants and for lumbering, and many who do not require help at present have indicated that positions will be open in a few weeks or months. The stream of men seeking employment is much larger than at any time since the end of hostilities, and the probability is that even more will be in search of work during the next two months. During December the Government Employment Bureau was not unusually busy, but at the turn of the year a noticeable increase was experienced. The best avenue for disposing of labor at present is for farm work. The demand for agricultural workers is very good for this time of year. Quite a number of men have signified their willingness to go to the land, and farmers have been coming in to the city to secure help. Quite a percentage of the men taking up farm work are married.

Montreal Fire.—Fire completely destroyed the auto and wagon plant of Jennings Co., 15 Wellington Street, Montreal, on the afternoon of January 12. About 150 automobiles were stored or being repaired at the time, and all of these will be a total loss. Among the cars destroyed were nine ambulances for the Canadian Government, just about ready for shipment. Considerable damage was also done to adjoining property. The total loss is estimated at a million and a quarter, Jennings & Co. suffering to the extent of over a million dollars. Other firms' losses are: M. B. Steine Co., wholesale boots and shoes, $20,000; McClary Mfg. Co., $20,000; S. J. Carter, [illegible] $20,000, and Hudson Bay Co., slight damage. The origin of the fire, according to officials of the Jennings Co., is thought suspicious; information in their possession led them to believe that an attempt of an incendiary character might be made against the plant, and a few weeks ago military protection was asked, as the firm was engaged on Government contracts.

On Eastern Trip.—Mr. Cribbs, representing the E. Pullan Co., of Toronto, has recently returned from an extended trip through Eastern Canada, covering particularly the Maritime Povinces. He reports that a large number of the shops that had shell contracts have not other lines ready to turn to and at present are simply marking time, and clearing up the last traces of shell work around the premises. In a couple of cases that came to his notice there were communities to which shell work had attracted larger numbers than could be absorbed in normal times, and there was naturally quite an exodus of people from these communities at present. Even some shops that had well established lines were finding some difficulty in returning to them immediately. They had been devoting a great deal of attention and shop room to the turning out of munitions, and it will take some little time for them to get things in shape for the production of their old lines again. The feeling seems to be that after the first four months of the present year things will begin to show a very decided improvement in a good many lines.

Looking for Business.—Ernest Crabtree, president of the Dominion Machinery Co., 110 Church Street, Toronto, leaves for England on January 20th via S.S. Olympic, with a view to securing contracts for Canadian manufacturers, and will open a place of business in London, England. Further announcements will be made regarding the address when Canadian manufacturers, who anticipate catering to export trade may communicate. Business will be carried on as usual at 110 Church Street, Toronto, where additional English lines will be represented. Mr. Crabtree, speaking to CANADIAN MACHINERY, stated that he was taking over an agency for the Knight Metal Products chuck, goods of the Superior Machine Co., and the Westman Machine Co., of London, Ont., as well as the grinders sold by the Dominion Machinery Co. He also represents the Positive Clutch & Pulley Co., of Aurora, and the Elliott Wood Worker, made in Toronto. Mr. Elliott, of this company, is going overseas with Mr. Crabtree, to demonstrate this machine, a portable one largely used by contractors. A warehouse will be opened in London as well as Toronto, and Mr. Crabtree is satisfied that there is sufficient business in sight to warrant his undertaking.

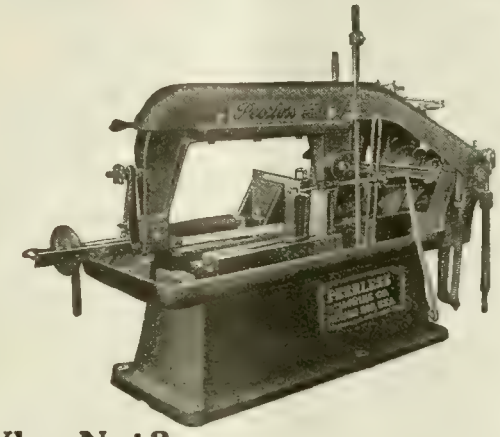
Making Emery Wheels.—In the manufacture of emery wheels one might imagine that the various degrees of hardness were achieved by varying the amount of "firing" to which the wheels were exposed. The baking process, as a matter of fact, has nothing to do with it. All degrees of grinding emeries, from very soft to very hard ones, can be baked in the same furnace at the same time—the different qualities being determined before "firing" by varying the proportion of bonding material and the abrasive element: the harder wheels, of course, having the higher percentage of abrasive. The fineness or coarseness of the stone is, of course, determined by screening the abrasive material, and ranges from coarse sand to the fineness of flour. Emery is mined largely in the Island of Crete, and in Turkey. The war, in stopping shipment from the Mediterranean, stimulated the invention of substitutes, and the Canadian and American laboratories have produced abrasives which many consider better than the emery they are meant to replace. We in Canada never had to wear paper clothes, or drink turnip coffee, but we surely have learned new uses for many odd materials, and many odd uses for new materials.

Exhibit of I.M.B.—Before the Imperial Munitions Board passes out of existence it is having made an exhibit of the work that was carried on in this country under its direction. The space occupied will be about 70 feet long and will be in the form of three steps. One of these exhibits will go in the Dominion Archives at Ottawa, another goes to Montretal and the third to Toronto. Material for these displays have been collected at Ottawa, and the work of putting them together is well under way. There will be, in shells, a display of the British types from the 15 pr. to the 9.2, and in the American from the 75 mm. to the 9.2. From the Dominion Arsenal will be shown cartridge cases, fixed ammunition and small arms ammunition, as well as American and British fuses. Certain styles of inspection gauges will be on exhibition, but it would be impossible to show all the various types of gauges that were used in inspection at different times. Four models of wooden ships will also be shown, the models being about six feet in length. There will be only a small display in airplane work, as there are so few models available. One, which is the property of Brig. Gen. C. E. Edwards, director of inspection in Canada, has been turned over to the exhibit that is to be placed in the Dominion Archives at Ottawa. Included will also be exhibits of T.N.T.,

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production 50 to 100%



Why Not?

WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material;

AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good;

THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.

1607 RACINE STREET — RACINE, WISCONSIN

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types

FORGING FURNACE

For
Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting
Shell Types

TORONTO OFFICE:

Standard Fuel Engineering Co.

W. N. KIRK, Manager
909 Excelsior Life Building
Phone Main 385

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

HERE IS YOUR OPPORTUNITY

You have decided to advertise and you want the better paper—TRY

Canadian Machinery

143-153 University Ave.,

TORONTO, CANADA

GRAPHIC PRODUCTION CONTROL

Increases Output

Write —

Anderson's Efficiency Service

380 Queen St. West Toronto, Canada

BLACK DIAMOND OVENS

OVENS

Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.
Kernchen Siphonage Ventilators, Bakers' Ovens, trucks, castors, etc.
Write for Booklet.

Brantford Oven & Rack Co., Ltd.

Brantford, Canada.

PLEWES Limited

WINNIPEG

For All

Machinists' Supplies

BERTRAMS LIMITED

SCIENNES EDINBURGH

Designers and Manufacturers of
PAPER MILL MACHINERY
Also Machinery for Rubber Mills, Linoleum Mills and Machine Tools for Constructional Work.

CASTINGS

Medium Weight Grey Iron, Brass, Etc.

JOBBING

GREENLEAFS, LIMITED

Belleville, Ontario

Prompt Deliveries

on Gauges, Tools, Dies, Jigs and Fixtures

Special Machinery

CUT GEARS

Contracting and Repairing Machinists

Quotations cheerfully submitted.

Normac Machine Co.

55 Vine Street, St. Catharines, Ont.

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

You Know How Greatly it Increased

Production

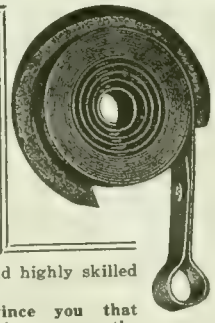
You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkridge Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every Description

Hawkridge Brothers Company

303 Congress St., BOSTON, MASS.
U. S. A.



'Barnes-Made' Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857.

THE WALLACE BARNES COMPANY

218 South St., Bristol, Ct., U. S. A.

Manfrs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

gun cotton, cordite, etc., but these dangerous things will not be exhibited in reality. Rather will they be imitated, and this work has been very successfully carried on, and is practically completed now. The I.M.B. exhibit will also show the minerals that have been used largely in the war work, including lead, copper, tungsten, etc. Each shell and other piece of work will be labelled showing the value of that product turned out. The latest figures will be used, and it is believed that the total production of munitions, etc., in Canada will be shown to have been in the neighborhood of $1,116,000,000.

MARINE

Victoria, B.C.—The boilers for the twenty ships being built for the French Government by the Foundation Company will be made by the Vulcan Iron Works. The order amounts to about $1,000,000.

Vancouver. B.C.—J. J. Coughlan says British shipyard interests are already under-bidding British Columbia builders, and that there will be keen competition between shipyards here and the Old Land as soon as the present tonnage shortage is overcome.

New York.—United States shipping men are beginning to feel some anxiety with regard to the future. They are convinced that very keen competition will have to be met with the other maritime nations, especially Great Britain. After expending $3,000,000,000 in the construction of shipyards, in building and equipping ships, it is far from a certainty that the United States can compete successfully with the merchant marines of other nations.

Toronto.—On December 11th, 1917, the waters of Toronto bay were frozen over and remained so until April 5, 1918, when the ice broke up and moved out through the eastern and western channels to the lake. There was some indication that it might again freeze over Saturday, but the rise in the temperature kept it clear.

In 1913 the waters of the bay did not freeze until January the 13th, and remained so until March 20th. The following are the records for the past ten years:—

	Frozen	Cleared
1908—	On Dec. 14	March 29, 1918
1909—	On Dec. 27	March 27, 1909
1910—	On Dec. 10	March 20, 1910
1911—	On Jan. 6	March 31, 1911
1912—	On Jan. 9	April 16, 1912
1913—	On Jan. 13	March 20, 1913
1914—	On Dec. 15	April 2, 1914
1915—	On Dec. 26	April 2, 1915
1916—	On Dec. 27	April 3, 1916
1917—	On Dec. 11	March 28, 1917
1918—		April 5, 1918

Yarmouth, N.S. — The new schr. George Melville Cochrane was launched at Port Greville on Tuesday, Dec. 31. She is 820 tons register, has two decks, is fitted with stockless anchors, gasoline hoisting power and is classed in Bureau Veritas for 13 years. She is one of the largest and finest vessels ever built at that place. She has been sold to Adam B. MacKay, of Hamilton, Ont., and will be towed to St. John where she will load for a southern port.

Ottawa.—The Canadian Government Merchant Marine, Limited, has been incorporated with a capitalization of $1,000,000. The head offices of the company will be in Toronto. Those mentioned in the letters patent as being incorporated are Gerard Ruel, barrister-at-law; Lorne William Mitchell, Treasurer; Wilfred Bankart Langmore, Solicitor; Charles Durno Cowie, Secretary, and Frederick Joseph Buller, Paymaster, all of Toronto. The new company is authorized to own and operate steamships and water craft of every description; to acquire all structures, buildings, hotels, shops and equipment necessary to operate, docks, wharves and harbor facilities, and generally is given full authority to take any steps necessary for the carrying on of its work. Announcement was made by the Minister of Marine, early in November, that it was the intention of the Government to place the operation of Government shipping under corporate control, in co-operation with the Canadian National Railway System.

Owen Sound.—The tug Harrison returned to Owen Sound Dec. 27th, after one of the most eventful trips that she ever had. She was engaged in towing half of the steamer Atikokan to Kingston and when near Port Colborne she burst a steam pipe and the chef, Landon Taylor, was scalded to death by escaping steam, and the engineer, Mr. Robertson, was badly scalded. She delivered her tow at Kingston and started for Owen Sound, expecting to reach that port before Christmas, but on account of heavy weather, snow, and the fact that all the aids to navigation were withdrawn, it was found necessary to put into Harbor Beach, Mich., and wait there for favorable weather. The Harrison is under command of Capt. Waugh and is one of the strongest and staunchest tugs on the lakes. She will winter at Owen Sound.

London.—Mines and mine fields were rendered obsolete by the developments of the "Paravene," the invention of Lieut. Burnley, and consistently urged upon the British navy by Admiral Sir Hedworth Meux. This instrument was officially adopted by the navy early in 1916, and was so successful that special factories were built for its construction. It is now learned that the British Grand Fleet on several occasions pushed right into the Bight of Heligoland, which, if mines meant anything, would have been a death-trap for ships. German experts never solved the mystery. From the time of its adoption to the close of the war, only two warships were reported having been sunk by mines. The most recent use of the "Paravenes" was on the occasion of British war-ships entering the Baltic through a closely mine-strewn area. The steel wire mooring ropes of the mines are said to have been cut by the "Paravenes" as easily as string is cut by scissors.

PERSONAL

Thomas P. Orchard, formerly production manager on the Browning machine gun tripods, with the New Britain Machine Co., New Britain, Conn., has joined the Service Engineering Co., planning and quantity production specialists, 25 Church St., New York City, as sales engineer.

Walter V. Turner, manager of the engineering department of the Westinghouse Air Brake Company, of Pittsburgh, and an inventor of note, died following a brief illness. Mr. Turner had more than 400 patents granted for various inventions. One of these, the "K" triple valve, is said to be valued at $28,000,000.

G. H. Duggan has been appointed to the presidency of the Dominion Bridge Co., to fill the vacancy created by the retirement of Phelps Johnson, the former president. Mr. Duggan has had a long service with the company, and for the past several years has acted in the capacity of vice-president and managing director, and has been closely associated with most of the important developments and extension of the Dominion Bridge Co. Mr. Johnson will remain on the board of directors of the Bridge Co., and will also serve on the executive committee.

In the death of Julius E. Waterous, which took place at his home, Bonnythorpe, Brantford, on January 11, the city lost one of its industrial leaders. He was one of the founders of what is now the Waterous Engine Works, one of that city's largest industrial plants, with which he was connected as mechanical manager and vice-president until he organized the Waterous Works, which he successfully conducted until he retired from active business in 1910. He was seventy-five years of age at his death. He is survived by his wife, formerly Miss Annie Van Someren, and two sons, Reginald and Bertram, who have just returned from overseas, where they were connected with the Canadian Artillery. Among the works with which Mr. Waterous was connected were the waterworks plants at Windsor, Orangeville and Lindsay, constructed under his supervision, following the installation of waterworks in his home city, the first in Canada.

MUNICIPAL

Hamilton.—Industrial Commissioner C. W. Kirkpatrick announced that he was moving in regard to having a deputation wait on the Government at Ottawa soliciting the establishment in Hamilton of a terminal elevator with a minimum capacity of a million bushels of grain. The agitation for such an elevator in the province has been going on for some time and is fostered by Hon. G. S. Henry, Minister of Agriculture in the Ontario house. Mr. Kirkpatrick believes that Hamilton will have stiff opposition, principally by Toronto. It is believed that representatives from other sections of the province will oppose both Toronto and Hamilton and urge the location of the elevator in a grain growing section.

PATENT ATTORNEYS

RESEARCH BUREAU
REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.
SPECIAL RESEARCHES ARRANGED.
PATENTS, TRADE MARKS, ETC.
HANBURY A. BUDDEN, 112 DRUMMOND BLDG., MONTREAL
CABLE ADDRESS "BREVET"

PATENTS
Fetherstonhaugh & Co.,
The old established firm. Patents everywhere. Head office Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada.
Booklet Free.

PATENT YOUR INVENTIONS
Send sketch to Ottawa for free patentability report and list of Patent Attorneys' clients' patents advertised in the Patent Record.
Harold C. Shipman & Co. PATENT ATTORNEYS
CENTRAL CHAMBERS, OTTAWA, CANADA.

PATENTS TRADE-MARK AND DESIGNS
PROCURED IN ALL COUNTRIES
Special Attention given to Patent Litigation
Pamphlet sent free on application.
RIDOUT & MAYBEE, 59 Yonge Street
TORONTO, CANADA

PATENTS FOR SALE
Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.
Allentown Experimental Works
Allentown, Pa., U.S.A.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R. SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS U.S.A.

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

The Financial Post on "Bolshevism"

THE menace to the social and economic system of the nation to-day is "Bolshevism."

The trouble is that while there is general condemnation of the tactics employed in the extreme development of Bolshevism, there is far too wide encouragement given to the movement which leads to this state as a natural climax.

This is a time of world-wide social unrest. What is demanded of those mediums of public expression which would serve the best interests of all is a broad view of the relations of capital and labor and social problems which must be solved. For either faction to endeavor to shift the burden of reconstruction to the other is merely planting the seeds of Bolshevism.

Besides the terse, incisive article of which the above sentences are a part,

THE POST

THIS WEEK CONTAINS:

Big Profits and Higher Dividend for Union Bank
Holt Warns Against Paternalism by Politicians
Service-At-Cost Idea is Further Argued by Pitts
President Peacock Tells of Barcelona Company's Position on Radial Issue
Manufacturers and Problems of Demobilization
Case for Bell Company is Concluded
Prosperity From U.S. Banks From War Financing
Meeting the Foreigner on Good Terms
The Development of Industry by Science
Big Drop in Municipal Bond Sales Last Year
National City Co.'s Plans for Canada
Speculation as to Trend of Prices in Bond Market
Real Estate at Medicine Hat
Desire for Show Causes High Rents
Surtax Levied by Montreal on Public Utilities
Big Assessment Increase by City of Toronto
Imperial Life Hits New Record in New Business
Aftermath of Montreal Strike
Canada Life Able to Produce Large Surplus
Shipments of Gold and Silver to the States
Dominion Bridge Gets $1,900,000 From Quebec Government

Above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription which is $3.00 per year.

The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price $3.00 per year on receipt of bill or you may draw on me for this.

Name .....
Address .....
.....
C.M.

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

POSITIONS WANTED

EXPERIENCED INSPECTOR WITH EXECUtive ability. If you are going in for interchangeable manufacture and desire a man familiar with the most up-to-date systems of gauging and inspection which will reduce cost of manufacture and increase output, write stating full particulars to Box 543, Canadian Machinery. (c5m)

MECHANICAL AND STEAM ENGINEER open for appointment as plant engineer in an industrial plant or shipyard. Sound practical man with good initiative and executive ability, experienced in the maintenance and installation of medium and heavy machine tools, steam and air lines, transmission, etc. Age 37. Seventeen years' engineering experience, and held position as above in a large shipyard for seven years with marked success. Correspondence invited to Post Office Box 1965, Montreal. (c5m)

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

If you want something unusual

and it isn't advertised here, the logical thing would be to advertise for it. You'll find that a small ad in the Classified Advertising Section will save you a great deal of time in locating men or machinery. Look over these pages and if you don't see what you want, send us your copy to-day for next week's issue.

Canadian Machinery

Classified Advertising Section

143-153 University Avenue

TORONTO

FOR SALE

2 MOTOR DRIVEN COMPRESSORS, 329 FT. 2 Frog & Switch Planers. 2 Rail & Frog Fillet Multiple Drills. 2 Newton Cold Saws, Nos. 501 and 502. J. L. Neilson & Co., Winnipeg, Man. (ctfm)

FOR SALE—300 PIECES COLD ROLLED shafting, 2" rd. x 81¼", in fair condition. Price on application. Also several items Rivets, Bolts and Steel. Complete list on application. John Deere Mfg. Co., Ltd., Welland, Ont. (c26m)

TWO LOWDOWN TRUCKS FOR SALE. A. B. Ormsby Company, Limited, 48 Abell Street, Toronto. (c27m)

FOR SALE—HOOP STEEL. 8 TONS OF ⅝" x 22 gauge hoops, in coils, first-class condition. Price on application. Dominion Foundries & Steel, Limited, Hamilton, Ont. (c25m)

ONE SECOND-HAND JENCKES CORLISS ENgine 12" x 30". Cut, description and price on application to Canadian Ingersoll-Rand Co., Limited, Toronto, Ont. (ctfm)

TWO NEW STEAM TURBINE BLOWERS for blast or cupola use. Size and particulars on application or can be seen running. Apply to Box 141, Tilbury, Ont. (c7m)

ONE CLAYTON 6" x 8" x 6" AIR COMPRESsor in first-class condition. W. G. Utley, Machinist, Yarmouth, N.S. (c8m)

MACHINERY FOR SALE

POWERFUL HYDRAULIC BOILER SHELL plate bending machine. Takes plates 13 feet 6 inches wide by 1¾ inches thick. Complete with water saving appliance. Apply Murray McVinnie, Mavisbank Quay, Glasgow. (c27m)

SPECIAL MACHINERY

MANUFACTURERS—WE CAN UNDERTAKE work to any specification—munition production equipment or otherwise. Write W. H. Sumbling Machinery Co., 7 St. Mary St., Toronto

MACHINERY WANTED

SIX-FOOT RADIAL DRILL FOR BOILER shop; lathe to take in 12' between centers; air hoist, 10" cylinder, 4' lift with trolley; vertical air receiver, 44" inside dia., 14' high. The National Shipbuilding Co., Ltd., Goderich, Ont.

HYDRO MOTORS WANTED

TEN TO THIRTY HORSEPOWER. QUOTE prices and give full particulars. St. Marys Wood Specialty Co., Limited, St. Marys, Ont. (c4m)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

SITUATIONS VACANT

WANTED—A FIRST-CLASS DRAFTSMAN—one with experience on spiral and bevel cut gears preferred. State experience and salary expected. Apply McKinnon Industries, Ltd., St Catharines, Ont. (c4m)

Representatives Wanted

WANTED BY A COMPANY PRODUCING crucible cast steel in the United States, a representative in Canada who is thoroughly familiar with the tool steel business, especially High Speed Steel business in Canada. Answering advertisement state previous experience, age and salary wanted. Box 540, Canadian Machinery. (c2m)

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery

143-53 University Ave., Toronto

USED MACHINERY

In stock at New Glasgow and offered for sale:

1 "Bullard" lathe 20x12'-0"
1 "Curtis" air hoist 8"x4'-0"
1 "Matheson" hydraulic press 14"x24"
1 "Sturtevant" volume blower, No. 7
1 "Grant" riveting hammer, belt driven (NEW)
1 "Berlin" hardwood flooring planer and matcher, No. 88.

Write for particulars and prices.

I. MATHESON & CO., LTD.

Builders of Machinery

New Glasgow, Nova Scotia

tf

A Select List of New High Grade Tools for Immediate Shipment

2—14" x 7' HENDEY Toolroom Lathes.
2—14" x 8' LEBLOND, D.B.G., Q.C.G.
4—19" x 10' LEBLOND Heavy Duty.
1—16" x 6' CISCO Toolroom Lathe.
16", 20" and 24" GOULD & EBERHARDT High Duty Shapers.
18" GOULD & EBERHARDT Gear Hobbing Machines.
No. 2½ and No. 4 LEBLOND Heavy Duty Universal Millers.
No. 3 FORD-SMITH Universal Millers.
BECKER No. ABI Heavy Duty Vertical Millers.
No. 1 LEBLOND Universal Tool and Cutter Grinders, with and without power feed.
No. 2 OAKLEY Universal Tool and Cutter Grinders, power feed and wet attachment.
3' DRESES Heavy Duty Radial Drill, speed box drive.
20", 22", 25", 28" and 34" BARNES Upright Drills.
LANDIS Horizontal Floor Type Boring, Milling and Drilling Machines.
FOOTE-BURT Horizontal Boring Machine.

The A. R. Williams Machinery Co., Limited
64 Front Street West - TORONTO
Phone Machine Tool Dept., Adelaide 20

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

In Stock for Immediate Delivery

Turbo-Generator Units	Boilers
Direct Connected Units	Smoke Stacks
Motor Generators	Tanks
Rotary Converters	Condensers
Transformers	Air Compressors

Separate Published Stock Lists for above apparatus.
Staff of Engineering Specialists with three overhauling plants to SOLVE YOUR POWER PROBLEMS.

Buyers and Sellers of New and Used Machinery
Send us details of used plant for sale

MacGovern & Company, Inc.
285 Beaver Hall Hill - - Montreal
Offices: New York, Pittsburg, St. Louis.
Plants: Brooklyn, N.Y.; Lincoln, N.J., and Linden, N.J.

A Continent-Wide Service.

Riverside Machinery Depot

LATHES
1—28 x 14 Fay & Scott Engine Lathe. Used.
1—26 x 14 P & W Standard Engine Lathe. Used.
1—24 x 12 Perkins Blocked Engine Lathe. Used.
1—24 x 12 Springfield Ideal H.D. Engine Lathe. New.
1—21 x 10 Porter Standard Engine Lathe. New.
1—20 x 10 W & B Gear Head Lathe. Used.
1—18 x 8 LeBlonde Engine Lathe. Used.
1—18 x 8 Springfield Ideal G.H. Tool Lathe. New.
1—16 x 8 L & S Q.C. Engine Lathe. Used.
1—16 x 8 Porter Standard Engine Lathe. Used.
1—16 x 6 American Q.C. Engine Lathe. Used.
2—16 x 6 Filsmith Q.C. Lathes. New.
3—15 x 6 South Bend Standard Lathes. New.
1—7" x 12" Precision Bench Lathe. (Potter). New.
1—84" Fitchburg Low Swing Lathe. Used.

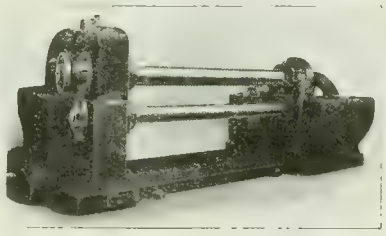
TURRET AND SCREW MACHINES
1—18 x 6 Springfield Fox B.G. Turret Lathe. Used.
1—14 x 5 Hendy Turret Lathe. Used.
3—12 x 4 Warner & Swasey Turret Lathes Used.
1—12 x 4 B & O Turret Lathe. Used.
1—12 x 4 Pearson Turret Lathe. Used.
2—No. 107—11" Wells & Son Turret Lathes. Used.
1—28" N. B. & P. Rigid Turret Lathe. Used.
1—14" Warner & Swasey Turret Lathe. Used.
2—3 x 36 J & L Flat Turret Lathes. Used.
1—No. 2 Warner & Swasey Hand Screw Machine. Used.
1—No. 2 S & K Hand Screw Machine. Used.
2—No. 3 S & K Screw Machines. Used.
1—3-4 Cleveland Automatic Screw Machine. Used.
2—2" Cleveland Automatic Screw Machines. Used.
1—No. 515 4-Spindle National Acme Automatic. Used.
4—No. 52 4-Spindle National Acme Automatics. Used.
1—No. 53 4-Spindle National Acme Automatic Used.
1—4¼ Gridley Automatic. Used.

SHAPERS AND MILLERS
1—25" Springfield H.D., B.G. Crank Shaper. New.
2—16" Springfield B.G. Crank Shapers. New.
2—24" Milwaukee B.G. Crank Shapers. New.
3—20" Milwaukee B.G. Crank Shapers. New.
1—16" Milwaukee B.G. Crank Shaper. New.
2—20" Columbia Crank Shapers. New.
1—16" Fox Crank Shaper. Used.
1—16" Hendy Geared Shaper. Used.
2—14" Hendy Friction Metal Shapers Used.
1—No. 1 U.S. Hand Miller. New.
1—No. 1 Garvin Hand Miller. New.
1—No. 1 Burke Bench Miller. New.
1—No. 3 Burke Bench Hand Miller. New.
1—Warner & Swasey Milling Machine. Used.
2—No. 0-B Fox Milling Machines. New.
1—No. 1 Dow B.G. Plain Milling Machine. New.
1—Fosdick 3½" Horizontal Miller. Used.
1—No. 10 Beeman & Smith 3½" Horizontal Miller. Used.
1—60" Bickford Vertical S.H. Miller. Used.

GRINDERS AND PLANERS
2—No. 4 Clizbe Bench Casting Grinders. New.
8—No. 3 Clizbe Casting Grinders. New.
3—No. 2 Clizbe Casting Grinders, on stand. New.
1—No. 3 Champion Bench Casting Grinder. New.
3—No. 0 Champion Bench Casting Grinders. New.
1—No. 3 Detroit Floor Casting Grinder. Used.
1—1¾ x 45" Standard Low Floor Casting Grinder. Used.
1—No. 14 Double End Pedestal Casting Grinder. Used.
1—Iron Foundry Builders' Pedestal Casting Grinder. Used.
1—8 x ¾ Casting Grinder on stand. Used
1—American Drill Grinder. Used.
1—W & M Tool Drill Grinder. Used.
1—Washburn Drill Grinder. Used.
1—Yankee Drill Grinder. Used.
2—W & M Yankee Drill Grinders. New.
1—No. 20 Landis Plain External Grinder. Used.
1—No. 60 Heald Cylinder Grinder. Used.
1—No. 2½ Woods Universal Tool and Cutter Grinder. Used.
1—No. 1 Thomson Universal Tool and Cutter Grinder. New.
1—Cutter and Reamer Grinder. Used.
1—6-A Gorton Universal Disc Grinder. Used.
1—24" Disc Grinder Press. Used.
1—No. 34 Horizontal Disc Grinder. Used.
1—Temco Electric Grinder on Pedestal New
1—Temco D Electric Motor Grinder. New.
1—Temco G Bench Electric Grinder. New.
1—Van Dorn Portable Electric Grinder. Used.
1—Hand Electric Grinder. New.
1—P-Tool Electric Grinder. Used.
5—Dumore A.T.P. Grinders. New.
1—Dumore B.T.P. Grinder. New.
2—Dumore G.A.C. Electric Type Grinders. New.
3—Dumore, Jr., Electric Grinders. Used.
1—No. 1 Landis Internal Grinder. Used.
1—Morse Face Grinder. Used.
1—8 x 7 Planer Type Surface Grinder. Used.
1—No. 6 Bryant Chucking Grinder. Used.
1—52 x 46 x 13' 3" Patch 2 Head Open Side Planer. Used.
1—46 x 40 x 13' 2" Patch 2 Head Open Side Planer. Used.
1—44 x 34 x 11' 4" Lincoln 2 Head Open Side Planer. Used.
1—24 x 24 x 6 Wilson Metal Planer. New.

RIVERSIDE MACHINERY DEPOT
25 St. Aubin Ave., Detroit, Mich.

8 ft. Lennox, Double Housing Type, Splitting Shear, capacity ¾-in. belt drive.



This machine is designed for straight shearing of sheets and plates and can be efficiently used for cutting round and square or flat bars.

Some New Machines In Toronto Stocks

LATHES

1 16 x 7" South Bend Screw Cutting Engine Lathe.

1- 18 x 8 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

1- 24 x 10 Ryerson Milwaukee Engine Lathe, 3-step cone, D.B.G., Q.C. feed.

1 18 x 8 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

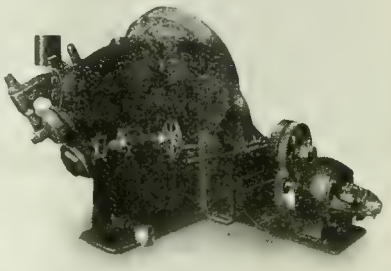
1 20 x 10 Ryerson Cincinnati Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

1 24 x 12 Lodge & Shipley Engine Lathe, 3-step cone, D.B.G., Q.C. gear box.

MILLING MACHINES

1 Ryerson-Owen No. 3 Universal, belt drive.
1—Ryerson-Conradson No. 3 plain, belt drive.

No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, capacity ¼-in.



The most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc.

DRILLS

3 20" Ryerson Rockwell Sensitive.
1—28" Ryerson Sibley Sliding Head.
1 4' Ryerson Radial Drill, Gear Box.
1 24" Ryerson Sibley Sliding Head.
1—30" Ryerson Sibley Sliding Head.

SHEARS AND PUNCHES

1—8' Lennox, Double Housing Type, Splitting Shear, capacity ¾" belt drive.
1 No. 3 Lennox Rotary Bevel Shear, arranged for belt drive, cap. ¼".
1—Ryerson Steel Frame No. 2 Hand Lever Shear, 6" blades, ¼" capacity.
1 Ryerson Steel Frame No. A-6 Hand Lever Punch, 6' throat, capacity ¼ x ¼.
1—Ryerson Steel Frame No. C-6 Hand Lever Punch, 6" throat, capacity ½ x ½.
1 Ryerson Steel Frame No. 5-A Hand Lever Punch, 3' throat, capacity ¼ x ¼.
1 Ryerson Steel Frame No. O-A Hand Lever Punch, 3" throat, capacity ¼ x ¼.

Garlock-Walker Machinery Company, Ltd.

Winnipeg — 32-34 Front Street TORONTO — Montreal

IMMEDIATE DELIVERY—MONTREAL STOCK

Motors, 3 Phase, 60 Cycle

2 H.P.,	550 V.,	1700 R.P.M.—1
10 H.P.,	550 V.,	1200 R.P.M.—9
15 H.P.,	550 V.,	1200 R.P.M.—2
30 H.P.,	550 V.,	900 R.P.M.—2
40 H.P.,	550 V.,	1200 R.P.M.—1
50 H.P.,	550 V.,	900 R.P.M.—2
75 H.P.,	2200 V.,	850 R.P.M.—1
125 H.P.,	550 V.,	690 R.P.M.—1
150 H.P.,	550 V.,	600 R.P.M.—1
200 H.P.,	2200 V.,	514 R.P.M.—2
400 H.P.,	2200 V.,	160 R.P.M.—1

Transformers, Pole Type 2200—$\frac{220}{110}$ Volts

¾ K.W.—11	2¼ K.W.—19
1 K.W.—15	3 K.W.—12
1½ K.W.—26	3¾ K.W.— 6
1 K.W.—24	5 K.W.—55

Our stock changes constantly. If not listed above please enquire anyway.

DOMINION IRON & WRECKING CO., LIMITED

General Offices:—Transportation Building, Montreal

If any advertisement interests you, tear it out now and place with letters to be answered.

High Class Machine Tools and Equipment for sale

We are completing our contract for Aeroplane Engines for the British Government and have for disposition, subject to prior sale, some of the finest type of Machine Tools and equipment in Canada, of Standard design and adapted to any class of fine work. These machines were procured especially for Aeroplane Engine Work, and are not needed for our regular automobile program.

The machinery is practically new, having been used but for a few months; and some machines have never been set up or used.

This list consists of Engine, Turret and Bench Lathes; Milling Machines, Shapers, Screw Machines, Planers, Single Spindle, Multiple and Radial Drills; Boring Machines, Grinding Machines, Slotters, Electric Motors, Blowers, Exhaust Fans, Welding Outfits, Chain Blocks, Chucks, Cutters, Reamers, Drills, Taps, Micrometers and Dial Indicators, and other fine measuring instruments, Tools, also raw materials and supplies of tool steel, High Speed Steel and Alloy Steels.

Lists of the above equipment will be supplied to intending purchasers upon application, and any of the equipment can be seen and inspected at our plant in West Toronto.

Willys-Overland Limited

WEST TORONTO - ONTARIO

IMMEDIATE DELIVERY

24-inch by 12-foot 24-inch by 16-foot

THE 24-in., WHICH IS EQUAL TO MOST 30-in.
THE LATHE WITH THE PULL
THE LATHE OF SIMPLIFIED ACCURACY

We have for immediate delivery a few 24-in. by 12-foot or 16-foot CISCO LATHES which on inspection show .0005 in 18-in. or better

SOME POWERFUL MACHINE, AND JUST AS ACCURATE AS IT IS POWERFUL

12-foot weighs about 8500 lbs.; 16-foot weighs about 9800 lbs.

ALL GEARS STEEL SIMPLICITY IN OPERATION NO OVERHANG

Inquire Particulars of

The A. R. Williams M'chy Co., Ltd.

TORONTO MONTREAL ST. JOHNS
WINNIPEG VANCOUVER

Made by

The Cisco Machine Tool Co.

CINCINNATI, U.S.A.

14-in., 16-in., 18-in., 24-in. Lathes

We Have Received Instructions to Dispose of Our

$2,000,000 Stock of High Grade Materials

Purchased for the Manufacture of Aeroplanes, and the Following is

OFFERED SUBJECT TO PRIOR SALE

ALUMINUM SHEETS

HARD DRAWN PIANO WIRE

NICKEL STEEL BOLTS AND NUTS

COPPER AND BRASS NAILS AND RIVETS

STEEL BARS 20-30 CARBON

BRASS AND COPPER SHEETS AND TUBING

SEAMLESS AND WELDED STEEL TUBING

COLD DRAWN 3½" NICKEL STEEL BARS

CAST AND MACHINERY STEEL AND COLD ROLLED STEEL

HOT AND COLD ROLLED SHEET STEEL

SHAFTING, HANGERS, BEARINGS, COUPLINGS, ETC.

EXTRA FLEXIBLE AIRCRAFT CORD

GASOLINE AND WATER HOSE

PAINTS, OILS, VARNISHES, ENAMELS

VENEER

TERNEPLATE

RUBBER MATTING

TOOL ROOM, MACHINE SHOP AND WOODWORKING MACHINES

Send Us Your Inquiries and We Will Quote You Attractive Prices

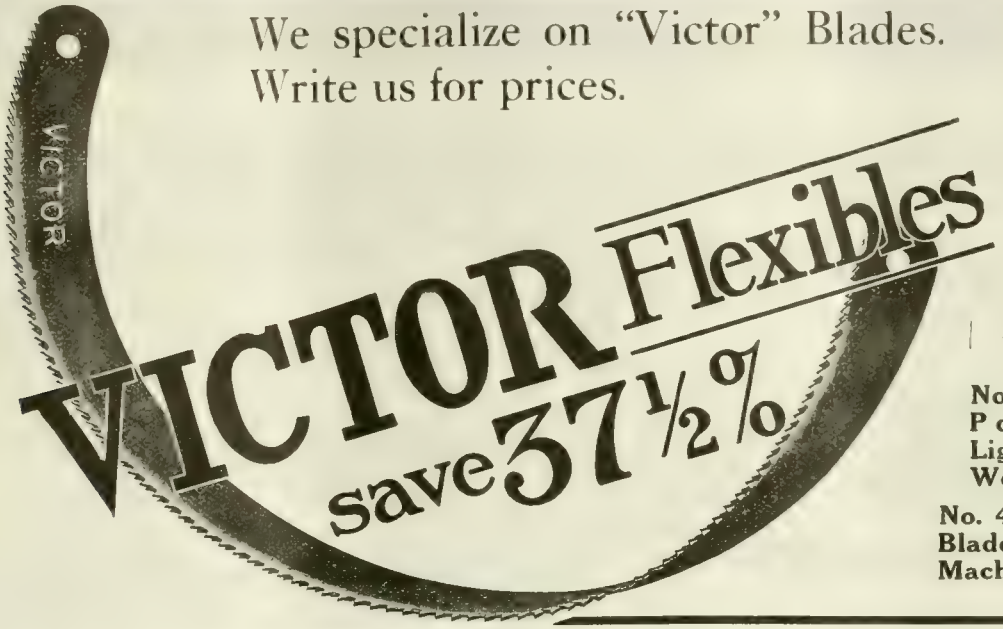
CANADIAN AEROPLANES LIMITED

TORONTO

P. O. Box 638

RICE LEWIS AND SON
LIMITED

ESTABLISHED 1847 TORONTO, ONTARIO 19 VICTORIA STREET



We specialize on "Victor" Blades.
Write us for prices.

VICTOR Flexibles
save 37½%

And write us for leaflet telling the right way to use Hack Saws—and the wrong.

No. 1. All Hard for Hand Frames.

No. 2. Soft Back Flexible for Hand Frames.

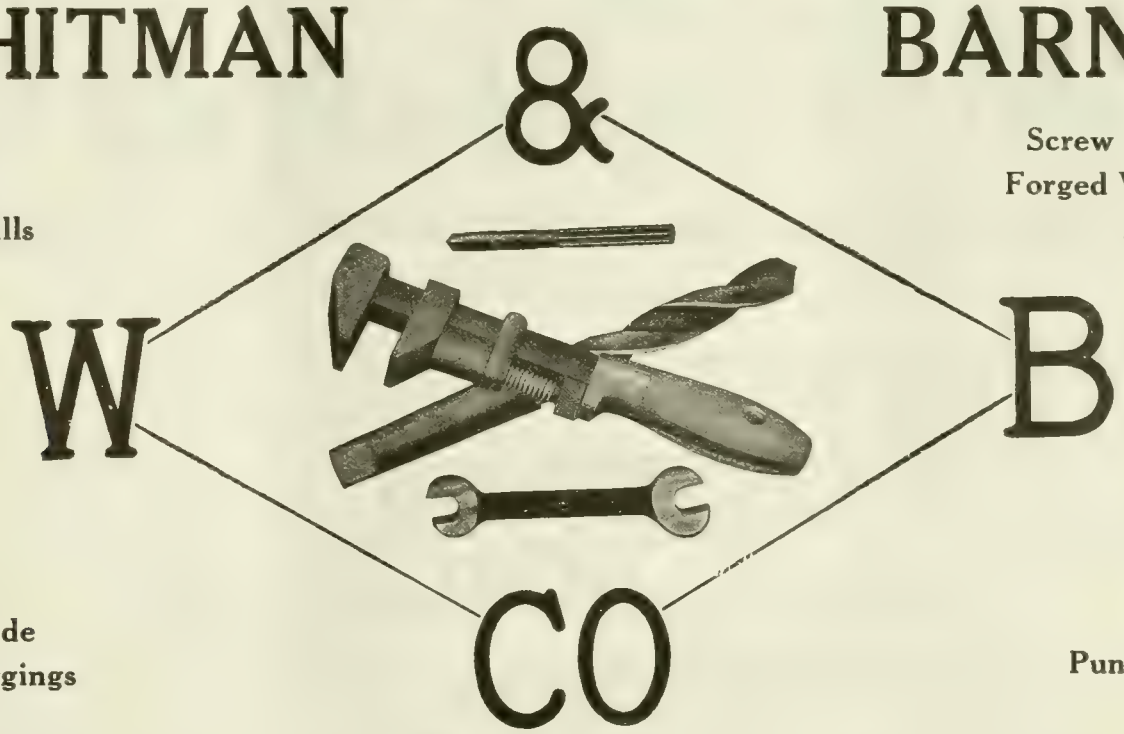
No. 4. All Hard Power Blades for Light Power Machine Work.

No. 4. All Hard Power Blades for Heavy Power Machine Work.

WHITMAN & BARNES

Reamers and Twist Drills

Screw and Drop Forged Wrenches Hammers



Special High Grade Drop Forgings

Cotters Chisels Punches, Etc.

Users recognize "W & B" Tool Quality, backed by 64 Years' Uninterrupted Experience. If your Jobbers and Dealers cannot supply, write us and we will see that you are supplied. Send for Catalog No. 90.

THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY - - ST. CATHARINES, ONTARIO

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

ELLIOTT & WHITEHALL
MACHINE & TOOL CO.
GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
GAUGES GASOLINE ENGINES
GEAR CUTTING

ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

Hyde Engineering Works
27 William St. - - Montreal

Enquiries Solicited for

General Machine Contract Work

P. O. Box 1185 Telephones 1863-1864

At Your Service

Let Us Quote on Your Contract Work

Our Staff is always available for Consultation.

PATTERNS
CASTINGS
FORGINGS

And Machine Work of all Kinds

VICTORIA FOUNDRY CO., LIMITED

OTTAWA - CANADA

DIAMOND TOOLS
FOR TRUEING GRINDING WHEELS

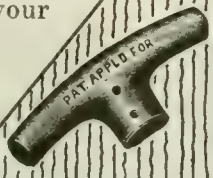
SERVICE QUALITY SATISFACTION
INDUSTRIAL GEMS

The GENERAL SUPPLY COMPANY of CANADA, Limited
OTTAWA TORONTO MONTREAL WINNIPEG VANCOUVER
356 Spark St. 38 Toronto St. 403 McGill Bldg. 85 Water St. 906 Vancouver Block
Sole Canadian Agents for
THE JOYCE-KOEBEL COMPANY, INC.
NEW YORK Formerly Geo. A. Joyce Co., Ltd. LONDON

TOOLS & STAMPINGS

We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St. HAMILTON



Let us show you that with our first class equipment we can save you money on

Special Machinery

Our extensive experience in this field is at your service.

Globe Engineering Co., Limited

HAMILTON GEC CANADA

Grey Iron Castings

We are in an excellent position to give quick delivery on high grade castings up to 10,000 lbs. in weight. Send your Blue Prints for quotations.

Our up-to-date Pattern Shop can handle your Pattern Work expeditiously and well

Welland Machine & Foundries, Ltd., Welland, Ontario

Accuracy WE MAKE **SPECIAL EQUIPMENT** *Reliability*

SPECIAL TOOLS, JIGS, FIXTURES AND CUTTERS

LIMIT A fully equipped tool-room and machine-shop with a competent staff are at your service **GAUGES**

THREAD, PLUG, RING AND SNAP GAUGES

MARTEN MACHINE CO., Main St. and Gage Ave., HAMILTON, ONT.

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD.

370-386 PAPE AVE., TORONTO.

CUSHMAN

We've been Manufacturing

Nothing but Chucks and Their Accessories

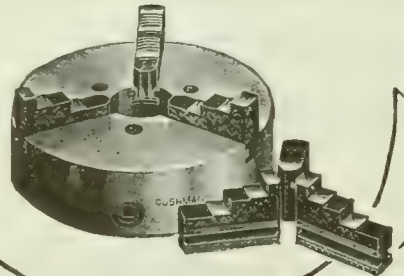
FOR NEARLY 60 YEARS

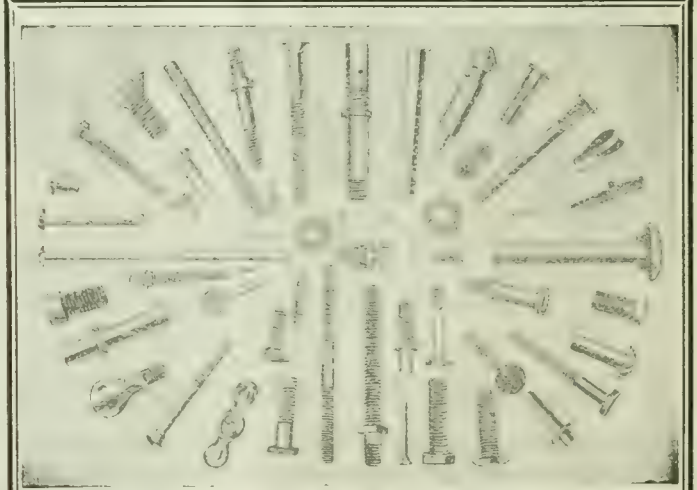
AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.

Cushman Chuck Co., Hartford, Conn., U.S.A.





Automatic Screw Machine Products

ACCURACY QUALITY

Our Mechanical Engineers are at the service of our Clients.

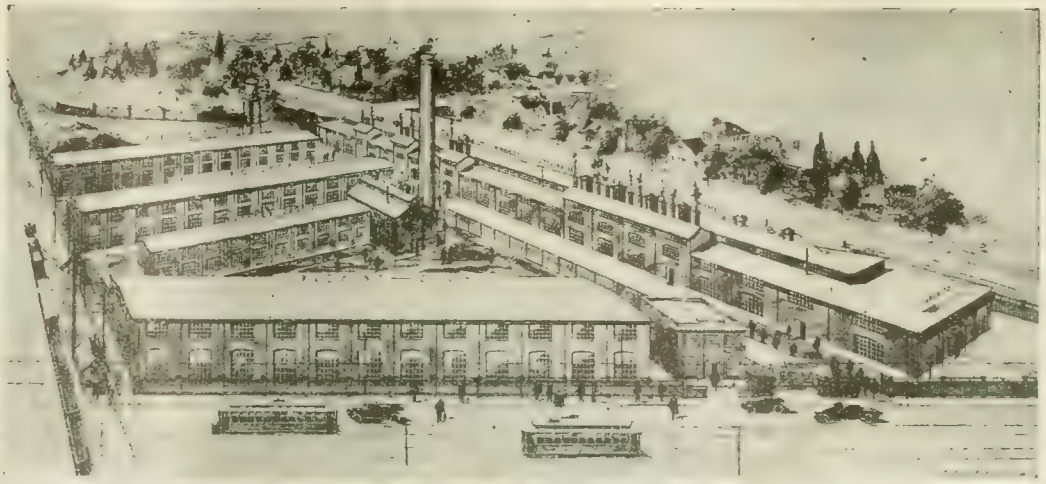
United Brass & Lead, Limited

St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*

Formerly Superintendent National Cash Register Co.

WE ARE ENLARGING OUR PLANT



Hull Iron & Steel Foundries, Limited

"HISCO" will shortly have an increased capacity which will make it the largest foundry of its kind in Canada.
Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300' x 100' is about to be completed.
This will place us in a position to handle orders big and small with unequalled facility.

We make steel, Chrome, Manganese and Nickel Steel Castings—annealed and unannealed.
Cement Mill and Mining Machinery Castings; Stamp Mills, Crushing Plants, and Excavating Outfits.
Steel Car Wheels, Locomotive Driving Wheels and Frames, and all Castings for car builders and locomotives.
GEARS—Machine moulded, any size up to 18 feet without patterns.

Hull Iron & Steel Foundries, Limited, Hull, Que.

Dominion Cast Steel Parts

We are also prepared to furnish steel plate to 20" wide — for prompt delivery.

We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

Open Hearth Products

Machinery Castings of all kinds, Motor Frames, etc., for electrical trade, Pedestal and Miscellaneous Bridge Work, Rolling Mill and Blast Furnace Castings, Gears and Gear Blanks.

Quick Deliveries

Quality and Economy

THE DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON - - ONTARIO

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

Free Tool Grinding Chart

Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me / us free, one of your tool grinding charts.

Signed.....

Firm Name.....

St. Address.....

City.....

Prov. .....

That STOCO "CELOGLAS" SHATTER-PROOF LENS saved my sight

Your men will appreciate the protective advantages of this new STOCO **"Celoglas"** lens. It's the best possible protective lens in the best possible protection goggle.

The new **"Celoglas"** lens will be supplied only in STOCO safety goggles. It is composed of a sheet of thin celluloid cemented by an exclusive process between two clear glass lenses. It has practically the same percentage of visibility as a lens made entirely of optical glass, and a very much higher degree of eye protection.

"Celoglas" lenses may fracture through a severe blow from a flying missile, but they will not leave the frame and the glass will not fly into the eyes of the wearer. You can supply them to your employees with the assurance of perfect security.

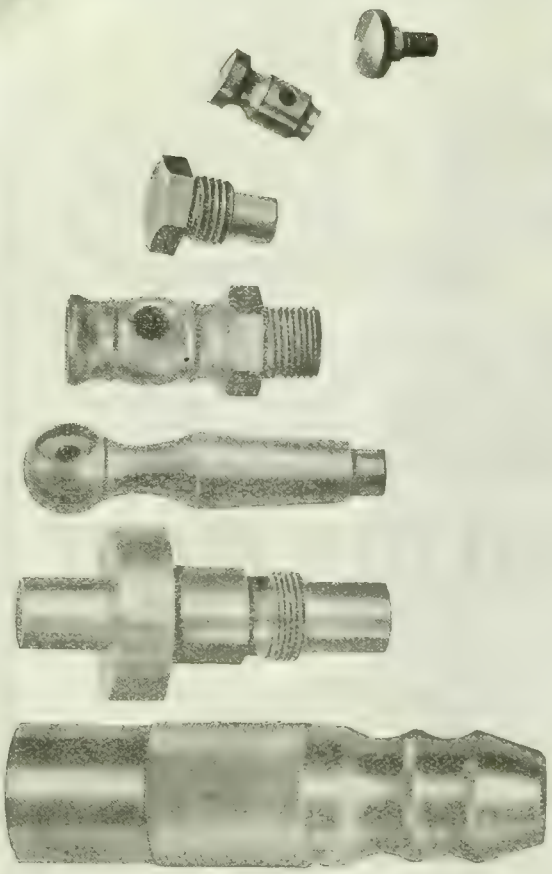
STOCO safety goggles are supplied with either easy cable teples, as illustrated, or with elastic headbands, each pair in an individual carton. The price is the same with either cable temples or headbands.

Price with heavyweight optical glass lenses, $115.00 per hundred pairs.

Price with **"Celoglas"** shatter-proof lenses, $150.00 per hundred pairs.

Sample with either **"Celoglas"** or regular lenses will be sent without charge to any safety engineer or superintendent upon request.

STANDARD OPTICAL CO.
GENEVA, N. Y.



From Bar Stock

To these Pieces on

ACME AUTOMATICS

IN THE TIME OF ONE OPERATION. IN SIZES UP TO 3¾" dia.—11" long.

Production that is continuous, economical, automatic and consistently accurate.

Complete data concerning the ACME MULTIPLE SPINDLE AUTOMATIC SCREW MACHINE will be sent on receipt of Samples or Blue-prints. Send for Acme Bulletin.

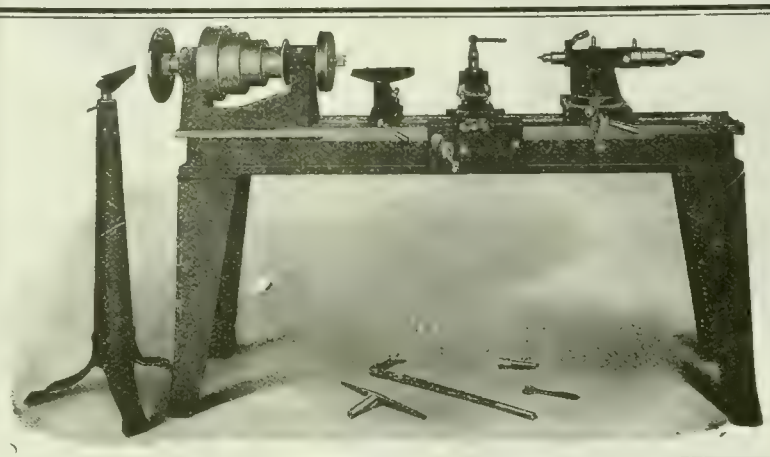
The National Acme Company

New England Plant WINDSOR, VT. **Cleveland, O.** Canadian Screw Plant MONTREAL, P.Q.

Branch Offices:

New York Boston Chicago Detroit Atlanta San Francisco
Warehouses: New York, Chicago With Foreign Representatives

Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vt., and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, O.



A Favorite—

Blount Pattern-makers' Lathe

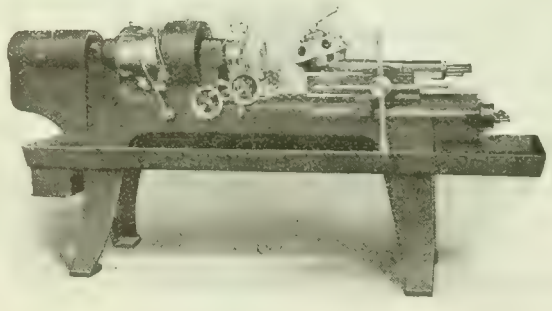
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR

CATALOG "C"

OR

ASK THE USER

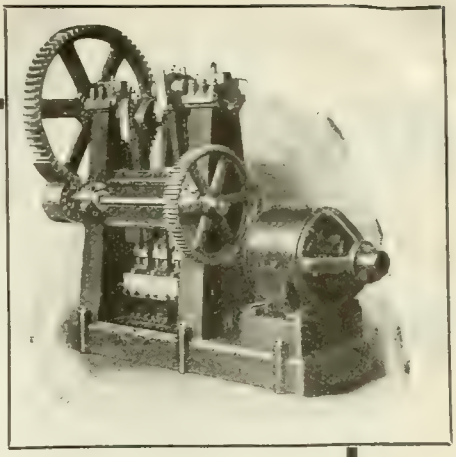
FIFTEEN YEARS OF SATISFIED USERS

WOOD TURRET MACHINE CO.
BRAZIL INDIANA U.S.A.

Heavy Duty Triplex Pumps

BELT DRIVEN OR DIRECT CONNECTED

DIRECT CONNECTED OR BELT DRIVEN. ANY PRESSURE UP TO 5,000 POUNDS, SIZES AND CAPACITIES UP TO 4½ IN. x 14 IN.—125 GALLONS PER MINUTE.



ALSO FULL LINE OF

HYDRAULIC PRESSES, ACCUMULATORS, VALVES AND FITTINGS FOR MUNITION PLANTS AND ALL OTHER PRESSING USES.

CATALOG "B" TELLS THE STORY

OUR SKILLED ENGINEERS ARE AT YOUR SERVICE TO HELP WORK OUT YOUR PRESSING PROBLEMS

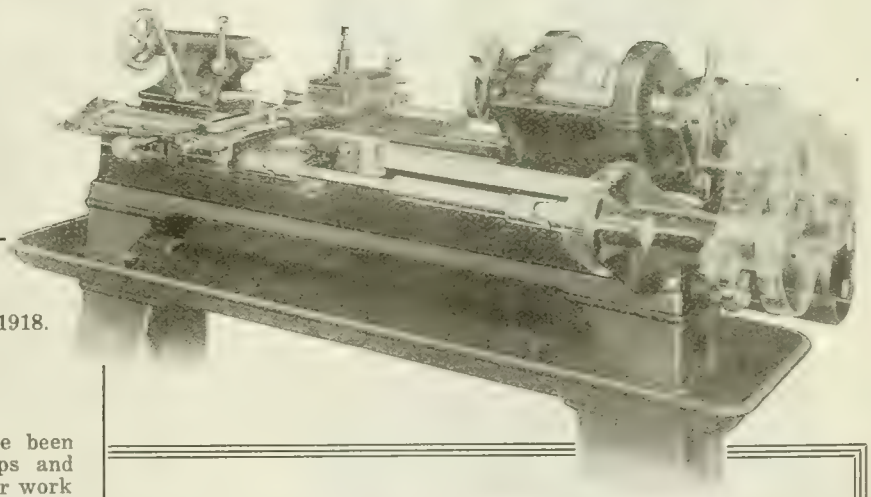
The Hydraulic Machinery Co., Limited

MONTREAL CANADA

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

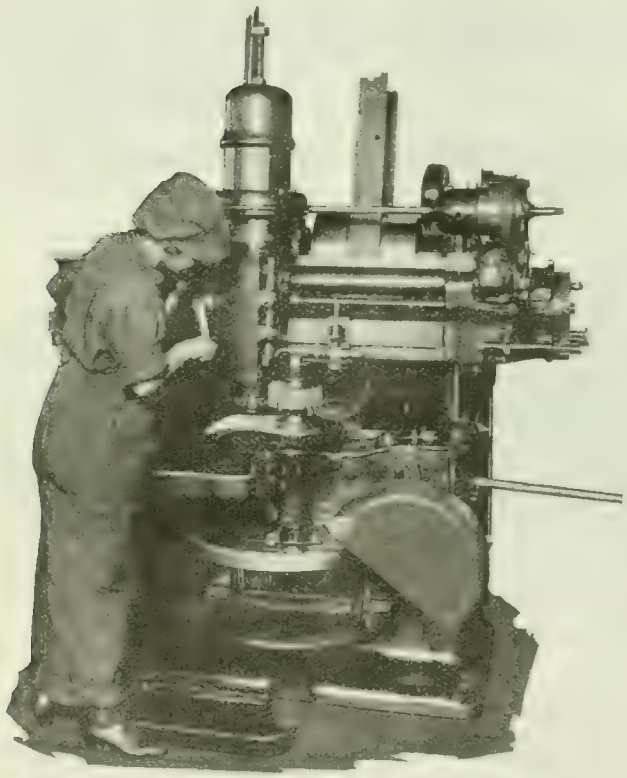
Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

If any advertisement interests you, tear it out now and place with letters to be answered.

There is Always One Best Way

CUT GEARS

And with our large and varied equipment we can place YOUR JOB on the BEST machine for its particular requirements.



Cutting Tractor Transmission Gears on Fellows Gear Shaper

Get Our Quotations

Hamilton Gear & Machine Co.

Van Horne St., Toronto

GREY IRON AND BRASS CASTINGS

We have the facilities, the men and the equipment to do your work and do it right. Quick service—right prices.

Send us your specifications when in need of SPECIAL MACHINERY.

Manufacturers of the Famous

TOMCO Bearings

These bearings give matchless satisfaction and last a lifetime. Used for heavy or light service. Give them a trial.

We do all our work, and can guarantee everything that leaves our shops. Enquiries promptly answered.

Tolland Mfg. Co., Limited

1167 Carrieres St., MONTREAL, Que.

"Strictly Up to You"

is the duty of so guarding dangerous machinery that even a **careless** workman can't get hurt or killed.

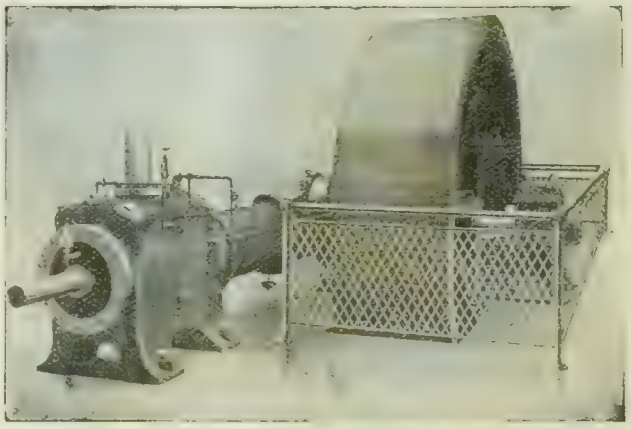
Heavy damage suits and useless regrets are avoided by installing inexpensive DENNIS Machine Guards. Make your plant **safe!**

Dictate us a letter to-day.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED

LONDON CANADA

Halifax Montreal Ottawa Toronto Winnipeg Calgary Vancouver



"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Tool and Gauge Work

Our present equipment, which is unexcelled in Canada, enables us to produce Thread Gauges, Tools, Dies, Jigs, Fixtures and other gauge work upon short notice.

Our usual guarantee of quality supports our claims.

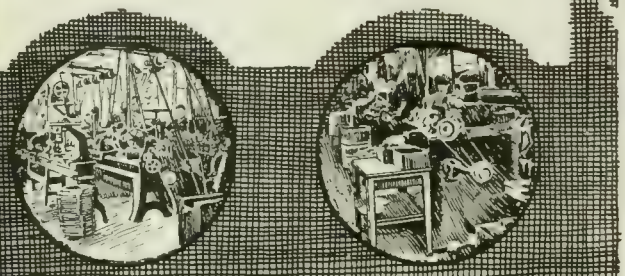
Windsor Machine & Tool Works
WINDSOR, ONTARIO
ESTABLISHED IN 1910
Representatives for Quebec Province: Canadian Utilities Steel & Engineering Co., 149 West Craig St., Montreal, Que.

If any advertisement interests you, tear it out now and place with letters to be answered.

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems

Toronto Tool Company
516 Richmond St. West Phone Adel. 1181



IMPERIAL CARBIDE

For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

Manufactured by
Union Carbide Co. of Canada, Ltd.

Head Office:
Dominion Bank Bldg.
TORONTO, ONT.

Works:
WELLAND
ONT.

Large Stocks maintained at convenient distributing centres throughout Canada

H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.
New Haven - Conn.

USED STEAM ENGINES
FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	**28"**
Length of Stroke of Piston	**48"**
No. of Revolutions per minute	**75**
Fly Wheel	**18' x 12½" Face**
Weight	**40,000 lbs.**
Rated Horse Power	**625**
I. H. P.	**700**
Max.	**950**

One 25" x 50" Left-Hand Wheelock Engine.
One 20½" x 46" Left-Hand Wheelock Engine.

These engines are in excellent condition.

Photograph and full particulars will be sent on application to

GUTTA PERCHA & RUBBER
LIMITED
Toronto, Canada

WHITCOMB-BLAISDELL

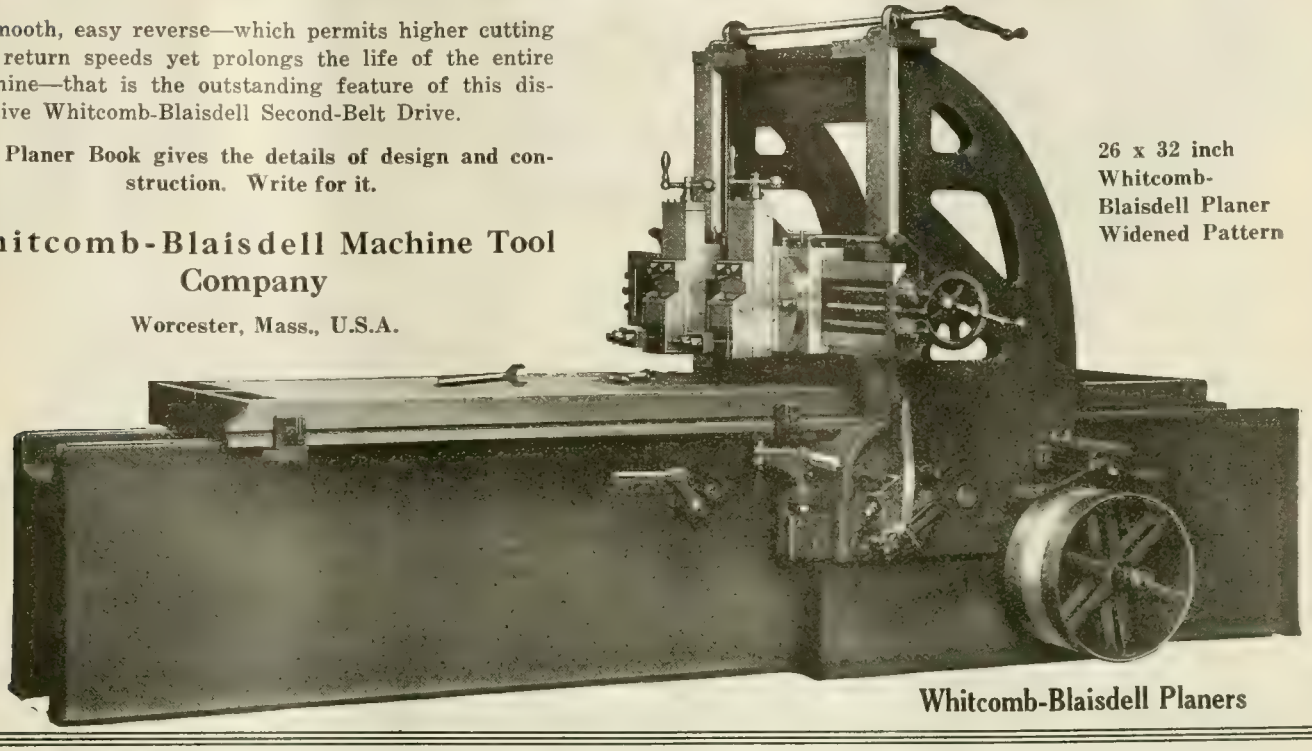
The Planer With the Second-Belt Drive

A smooth, easy reverse—which permits higher cutting and return speeds yet prolongs the life of the entire machine—that is the outstanding feature of this distinctive Whitcomb-Blaisdell Second-Belt Drive.

Our Planer Book gives the details of design and construction. Write for it.

Whitcomb-Blaisdell Machine Tool Company

Worcester, Mass., U.S.A.



26 x 32 inch Whitcomb-Blaisdell Planer Widened Pattern

Whitcomb-Blaisdell Planers

ESTABLISHED 1860

Sole Canadian Rights to Manufacture the

"HYDE"

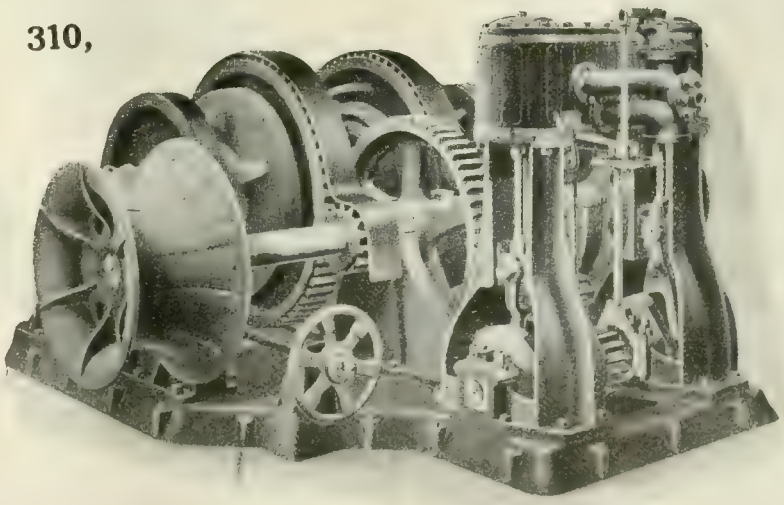
Anchor-Windlasses

Steering-Engines

Cargo-Winches

Which have stood the test of 50 YEARS

310,



The "HYDE" Spur-Geared Steam Windlass

Propeller Wheels

Largest Stock in Canada.

Heavy Gears,
Mill Repairs,
Water Power
Plant Machinery

Steel Castings

Manufactured by

The Wm. Kennedy & Sons, Limited

Owen Sound, Ontario

ALMOND Chucks and Micrometers

ALMOND CHUCKS ARE TOOL SAVERS

Simple to operate, powerful, accurate and durable, and cost less to operate.

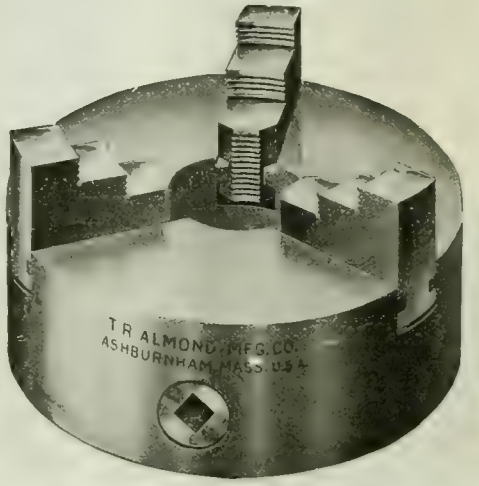
ALMOND MICROMETERS recognize comparison with Johansson Swedish Gauges only.

WE are in a position to fill your wants for Micrometers, Drill Chucks (all sizes), and Lathe Chucks of the smaller sizes, 5", 6", 7½" and 9".

ALMOND MICROMETERS are to be had in English or Metric measurements—1, 2 and 3 inches—25, 50 and 75 thousandths, adjusted to Johansson Swedish Gauges.

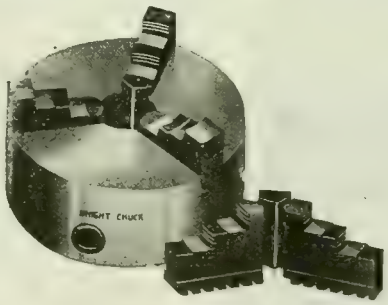
Write for full Information and Prices on these Quality Tools

For Immediate Delivery



T.R. ALMOND MFG. CO.

2 Maple Ave., ASHBURNHAM, MASS.



Scroll Chucks

Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks. First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches. These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

Knight Metal Products

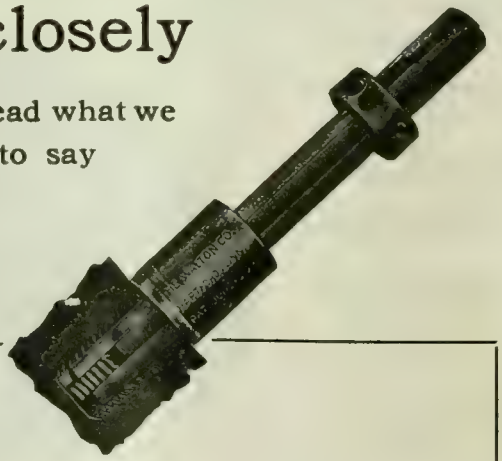
LIMITED

119 West Adelaide Street
Toronto, Ont., Canada

Cable: "Knightmetl"; Code, Western Union

Look at this again —closely

and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

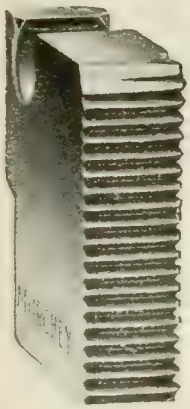
The Walton Company

Hartford, Conn.

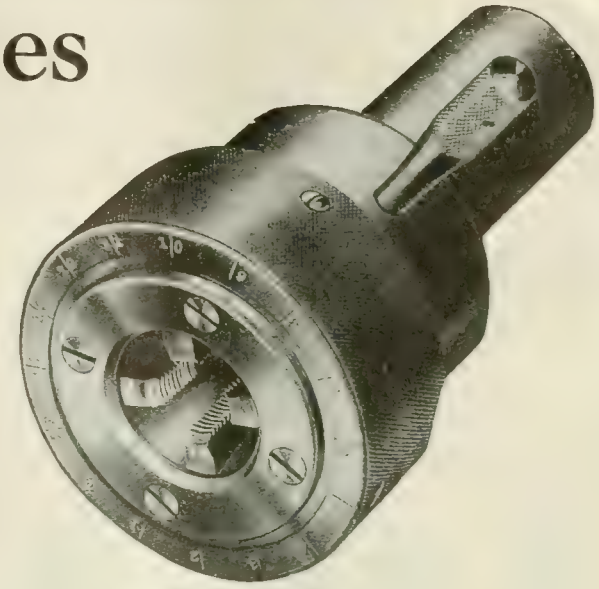
Quick Deliveries

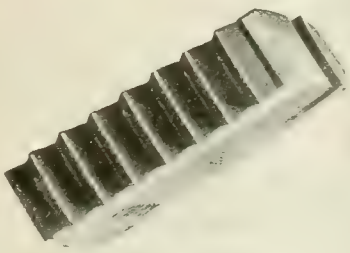
ON

MURCHEY CHASERS



We make a specialty of quick deliveries to the users of our tools, and if you'll become one of our patrons you'll find at the end of a year's time that you have saved many hours' valuable time through the quick deliveries we make on Murchey Chasers.





This saving, coupled with the great economy that always accompanies the use of **Murchey** Automatic Self-opening Dies, Collapsing Taps and Hand Sizing Taps, is a saving worth while in these days of high production costs. Use them.

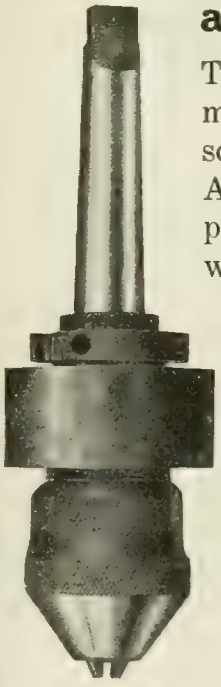
ENQUIRIES GLADLY ANSWERED

MURCHEY MACHINE & TOOL CO.

75 PORTER STREET, DETROIT, MICH.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. - - 16 Rue Fenelon - - Paris, France

Prevent Broken Taps and Spoiled Work



Tap breakage is a serious matter now owing to the scarcity of machine tools. And then there is the probability of spoiling the work as well.

The Bicknell-Thomas Friction Tap Chuck

eliminates all danger of these losses. It is simple, efficient, durable and easily adjusted. Is made in five sizes, capacities ⅛ in. to 1 in.

To prove our statement let us send you one on trial. Anyway, write for Illustrated Circular.

Bicknell-Thomas Company
Greenfield, Mass., U.S.A.

The Chuck that Grips
Certainly he has another hand! But—it only takes one—either one—to grasp the key and open or clamp the jaws. Just a mere twist of the wrist—that's all—and so quickly done.
Of course, he's smiling! They all smile. It's proverbial — the Jacobs' smile. It is the pleasure that comes from the use of Jacobs' Chucks.
The Man
The Tool
The Product
THE JACOBS MFG. CO.
HARTFORD, CONN, U.S.A.

If any advertisement interests you, tear it out now and place with letters to be answered.

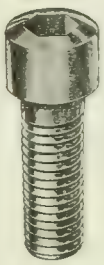
HINTS TO BUYERS

DIAMONDS
(Industrial)
MOUNTED or UNMOUNTED—Fine Quality

NORTON

GEO. ANDERSON & CO.
of Canada, Limited
157 Craig St. W.
Montreal, Que.

PRESSES and SHEARS
Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
BUFFALO, N.Y.



Socket Head Cap Screws

Clean cut socket holes, free from chips. Accurately threaded to standard gauges. Test them where great strength is desirable.

THE ALLEN MFG. COMPANY
HARTFORD, CONN., U.S.A.

TRADE MARK
BRISTOL'S ELECTRIC PYROMETERS
REG. U.S. PAT. OFFICE
FOR EVERY SERVICE

Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system, especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

Write for Bulletin I-205.

THE BRISTOL CO.
WATERBURY, CONN., U.S.A

SKINNER DRILL CHUCKS

New Model

THE LARGEST ASSORTMENT
Made By Any Manufacturer

The "New Model" is especially adapted to rapid, sensitive drilling. It is accurate, light, strong and hand operated. The price is surprisingly low. Illustrations of complete line on request.

THE SKINNER CHUCK CO.
Main Office and Factory
NEW BRITAIN, CONN.
New York Office—94 Reade St.
London Office—149 Queen Victoria St.
San Francisco Office—Rialto Building.

NEW AIR-TIGHT BLAST GATE
FOR LOW AND MODERATE PRESSURES

(Patented)

"The Air-Tight Blast Gates in use in our plant have given entire satisfaction."
CANADIAN PACIFIC RAILWAY COMPANY, Montreal, Canada.

Our NEW AIR-TIGHT BLAST GATE will save the air (**money**) you are now losing through leaky blast gates.

Circular 123-T explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow acting gate valves and stop cocks. Ask for circular and list of users

W. S. ROCKWELL COMPANY
Furnace Engineers and Contractors
50 Church Street, New York (Hudson Terminal Bldg.)
Canadian Distributors: Drummond, McCall & Co., Ltd., Montreal

RIVETED STEEL TANKS FOR EVERY PURPOSE

OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS
BOILER BREECHING - RIVETED STEEL PIPE BINS & HOPPERS

The HURLBUT-ROGERS CUTTING-OFF MACHINE

Cuts Off In Half The Time

The Hurlbut-Rogers Cutting-Off and Centering Machine is a big producer because there are TWO TOOLS instead of one, working in the same cut.
VERY POWERFUL, RIGID AND ACCURATE.
Pays its cost in savings effected in very few months.
ASK FOR FULL DETAILS.

The Hurlbut Rogers Machinery Co.
So. Sudbury, Mass.

FOREIGN AGENTS: England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne.
H. W. PETRIE, TORONTO, CANADA

DIAMOND POINTED TOOLS

Our line comprises Diamond Pointed Tools for every industrial purpose. We are also equipped to furnish promptly special Diamond Pointed Tools of every variety. Quality products.

ORDER FROM ST. CATHARINES if more convenient. Complete stock — quick service. Goods submitted on memorandum to responsible firms.

Wheel Trueing Tool Company, 88 West Pitt Street, Windsor, Ontario

John W. Gordon, Manager, 5 James St., St. Catharines.

NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by **A. O. NORTON, Limited**

Coaticook, Prov. Quebec, Canada

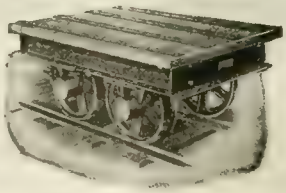
LANDIS MACHINE CO., INC.
WAYNESBORO, PENNA.

Manufacturers of BOLT and PIPE THREADING MACHINERY

Exclusive Canadian Agents:
Williams & Wilson, MONTREAL, Can.
Write for Catalogue No. 22.

WHITING TRUCKS

All kinds of Shop and Foundry Trucks



Write for Catalog.

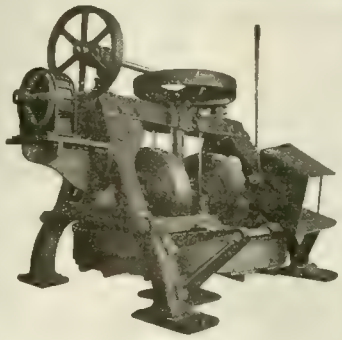
Steel Frame Shop Truck

Complete Foundry Equipment

WHITING FOUNDRY EQUIPMENT CO. HARVEY-ILL. U.S.A. CHICAGO SUBURB

Cranes of all Types

Canadian Steel Foundries Need Frost Improved Sand Mills



WINNING FEATURES:

Heavy Mullers
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

STEEL CASTINGS

ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.

PROMPT DELIVERY

Manitoba Steel Foundries, Ltd.
1204 McArthur Building
Winnipeg - - - Manitoba

Taylor-Newbold Milling Cutters

Fast Cutting Power-ful

Inserted Helical Blades of High-Speed Steel

For Service—Utility—Strength—Power
4-in. Diameter for General Use.

May We Send Bulletin R-P?

THE TABOR MANUFACTURING COMPANY
PHILADELPHIA, PA., U.S.A.

GEAR

GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass. U.S.A.
G. B. GRANT

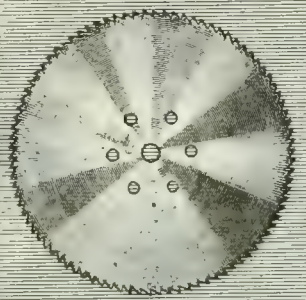
CUT YOUR COSTS
IT'S EASILY DONE WITH
ELM CUTTING OIL
WE ALSO SPECIALIZE IN DRAWING, FLOOR AND MOTOR OILS
ELM CUTTING OIL CO., TORONTO

Northern Crane Works
LIMITED
WALKERVILLE ONTARIO
Electric Cranes
Hand Cranes
Foundry Equipment

NORTHERN CRANES

CRANES MADE IN CANADA
Electric Hoists
Air Hoists
Cupolas
Ladles

HUNTER DUPLEX METAL CUTTING SAWS



Made in all sizes from 10" to 84" diameter.

Hot Saws, Friction Discs, Solid Blades made from Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines, Inserted Tooth Grinders, Hardened Steel Specialties, etc. Write for prices.

Hunter Saw & Machine Company, Pittsburgh, Pa

J.C.McLAREN BELTING

J.C. McLAREN BELTING — OAK TANNED — EXTRA — ESTD 1856 — C

Will Save You Money In Every Day of Service

Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

Ask for Quotations.

J. C. McLAREN BELTING CO. Limited

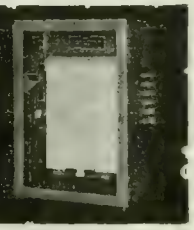
Montreal Toronto Winnipeg

Thwing Pyrometers

High Resistance Indicating and Multiple Record Types for all industrial purposes. Tell us your conditions and we will explain the economies or improvements that pyrometers will effect.

THWING INSTRUMENT CO.

34th St. & Lancaster Ave. Philadelphia, Pa. (35)



Toronto Testing Laboratory LIMITED

METALLURGISTS CHEMISTS FUEL ENGINEERS

160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.

INDUSTRIAL RESEARCH

Greenfield

Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.

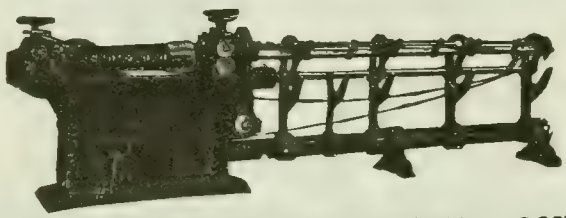
Do you want someone to handle your small stamping work?

An advertisement in the contest section will put you in touch with firms who have the facilities for handling small stampings, small tools, jigs, fixtures, etc. If you need their help, tell them so here.

CANADIAN MACHINERY

Contract Work Section

143 UNIVERSITY AVENUE :-: TORONTO



THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.

Formerly John Adt & Son. Established 1866.

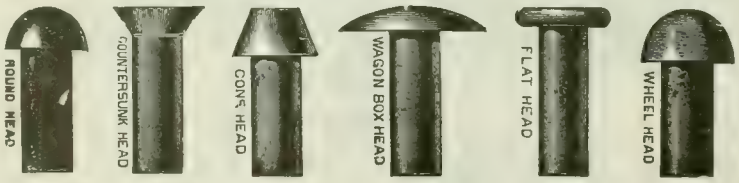
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Castings

Brass, Gunmetal, Manganese Bronze, Copper, Nickel Alloys, Aluminum, etc.

MARINE AND LOCOMOTIVE ENGINE BEARINGS. MACHINE WORK AND ELECTRO PLATING. METAL PATTERN MAKING

United Brass & Lead, Ltd., Toronto, Ont.



WE MANUFACTURE RIVETS of every description, ⅝ inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.

GANANOQUE, ONT.

ARMCO IRON Welding Rods

OXY-ACETYLENE ELECTRIC

AMERICAN ARMCO INGOT IRON

make *Safe* welding easy

ARMCO IRON Rods are practically pure iron and are peculiarly free from the sulphur, phosphorus, slag, oxides and other impurities that ordinarily destroy the homogeneity of the weld.

You will find it decidedly to your advantage to give ARMCO IRON Rods a careful test.

PAGE STEEL & WIRE CO.

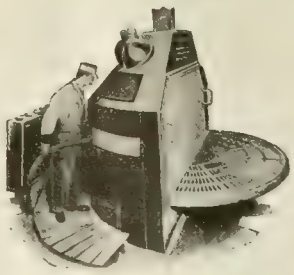
PAGE STEEL AND WIRE QUALITY PRODUCTS

Sales Offices: 30 Church St., New York

Plants: Monessen, Pa., and Adrian, Mich.

Western Representatives: Steel Sales Corporation, Chicago.

11



HYGIENIC TABLE-CABINET SAND-BLAST

One of the many sanitary types of PANGBORN SAND BLAST EQUIPMENT

If you haven't seen what you want write us—if we don't build it, we will.

No requirement too large none too small.

PANGBORN CORPORATION HAGERSTOWN, MD. SAND-BLAST SPECIALISTS P.O. BOX 8503

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The

GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

THEY ALWAYS MAKE GOOD

Write for Catalog.

Armstrong Bros. Tool Co.

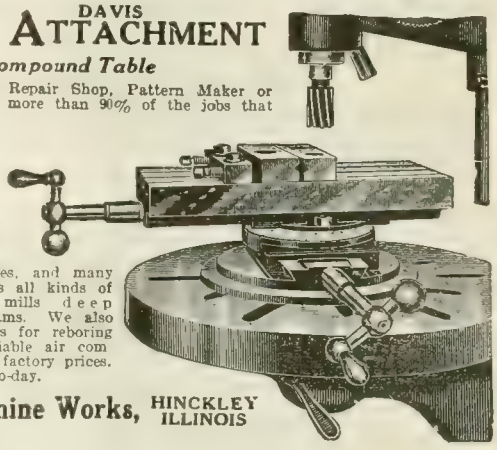
"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A

THE DAVIS MILLING ATTACHMENT

and Compound Table

For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



For any Drill Press 14" to 42" swing. Big Economy — Big Convenience — Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.

Hinckley Machine Works, HINCKLEY ILLINOIS

CLUTCHES

Combined Jaw and Friction. Friction only. Gas Engine Clutches. Jaw Clutches.

Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd., Canada

MONTREAL Factory: Aurora, Ont. TORONTO

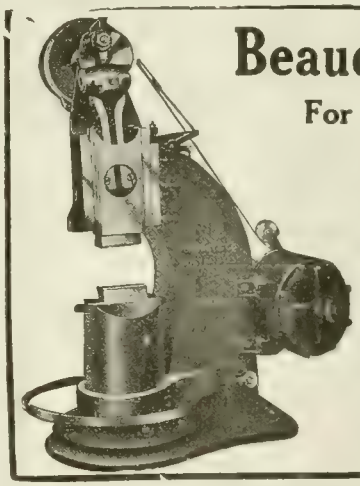
GIDDINGS & LEWIS MFG. CO.

FOND DU LAC, WIS.

Horizontal Boring, Drilling and Milling Machines, Sold in Canada by

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, Ottawa, Hamilton, St. John, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria



Beaudry Hammers

For General Forging

Save Fuel, Time and Labor. Cut Forging Costs in two.

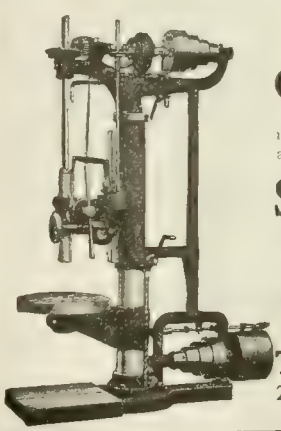
Belt or Motor Driven.

BEAUDRY & CO., Inc.

141 Milk Street

BOSTON, - MASS.

Alfred Herbert, Ltd., Coventry, England, London, Paris, Calcutta, Yokohama.



6 Positive Geared Feeds

instantly obtained, are but one of many advantages provided by

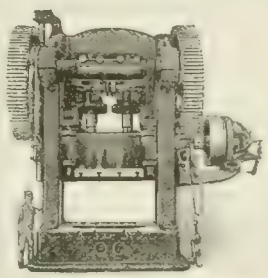
SILVER DRILLS

For 51 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

The Silver Manufacturing Co.

290 Broadway Salem, Ohio



PRESSES

FOR

CUTTING

FORMING

PUNCHING

STAMPING

EMBOSSING

and COINING

BAR and SHEET METAL

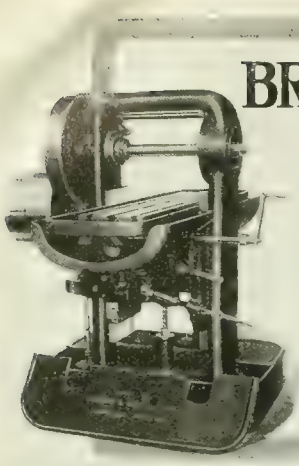
Double-Action Presses

Exerting pressures up to 2,000 tons.

Full information, with photographs, for the asking

Ferracute Machine Co.

Bridgeton, N.J., U.S.A.



BRIGGS MILLERS

This Miller is breaking production records wherever introduced. It handles work no other machine of its size can touch and it does perfectly accurate work. Rigid, powerful, accurate.

We should like to show how "Briggs" adaptability and convenience can better output and lower costs for you. Get in touch with us.

Gooley & Edlund, Inc.
CORTLAND, N.Y.

FOREIGN AGENTS: Allied Machinery Co., of America, Paris, Turin, Zurich, Petrograd, Barcelona; Burton, Griffiths & Co., Ltd., London, Manchester and Glasgow; Andrews & George, Tokyo.

OAKITE CLEANS

Our business is to solve your cleaning problem. Put it up to us!

OAKLEY CHEMICAL CO
44 THAMES STREET NEW YORK

PRESSES—ALL TYPES

BAIRD MACHINE CO. PRESSES AND FORMING MACHINERY

Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

Baird Machine Co., Bridgeport, Conn., U.S.A.

WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

IRON AND STEEL
HEAVY HARDWARE

Mill Supplies Automobile Accessories

WE SHIP PROMPTLY

Oxy-Acetylene Welding and Cutting Apparatus

OXY-ACETYLENE WELDING DAVIS APPARATUS DAVIS BOURNONVILLE CO. NY.

Carter Welding Co., General Dealers Toronto
For Davis-Bournonville Oxy-Acetylene Apparatus
General Office and Factory, Jersey City, N.J.
Canadian Factory, Niagara Falls, Ont.
Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.

CASTINGS

THAT ARE DEPENDABLE
BRASS, BRONZE, GUNMETAL, ALUMINUM and Other METALS
WRITE US

The Wentworth Mfg. Co.
Oak Avenue, Hamilton, Ontario

HIBBERT & PHILLIPS

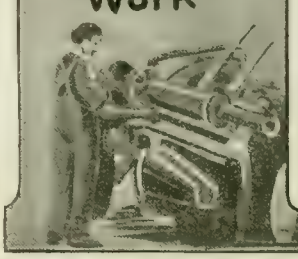
281 Emerald St. N.
HAMILTON ONT.

H&P

Special Machinery Builders

Repair Work

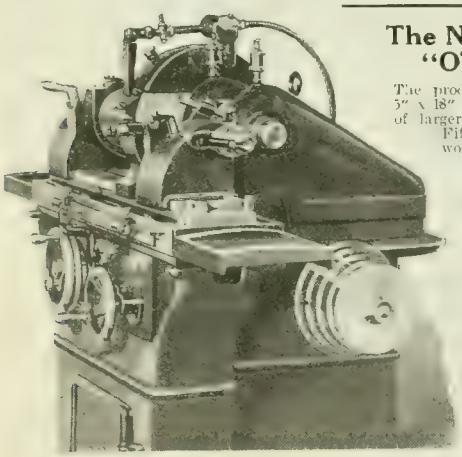
Die Makers and Special Machinery Builders



WE SELL METALS OF ALL KINDS

SCRAP	STEEL
Copper, Brass Lead, Babbit, Etc.	RAILROAD CAP AXLES. BARS BILLETS ETC.
INGOT	
Copper, Lead Spelter, Etc.	

B. ENUSHEVSKY & SON, Toronto, Can.



The Newest of the "OTT" Line

The production capacity of our 5" x 18" Plain Grinder is worthy of larger and costlier machines. Fifty-seven varieties of work, more or less, from cast iron bushings to high-speed steel cutters, take their accurate finish from Ott Grinders; and the initial machine in any plant — no matter what it makes — invariably recommends others.

Write for full particulars.

OTT Grinder Co.
Indianapolis, Indiana

"Nichrome" Castings

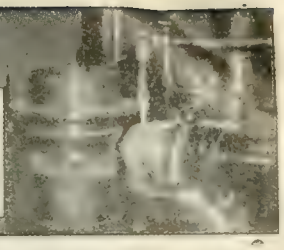
"Made to Endure High Temperature"

CANADIAN DRIVER-HARRIS CO.

WALKERVILLE, ONT.
CANADA

CHICAGO
HARRISON N.J.
BRIT SH WORKS MANCHESTER ENGLAND

Cutting Compound



HYDROLITE Cutting Compound is used by the largest shell makers. Increases production; will not gum machines or rust. Antiseptic. Try it.

Ontario Lubricating Co., Limited
HAMILTON, ONT.

Send for our New Catalog of
SAFETY AND FIRST AID EQUIPMENT

We Manufacture
Adjustoglas Goggles
Respirators
Safety and Danger Signs
First Aid Cabinets
Hospital Equipment

Masks and Helmets
Leather and Asbestos
Leggings and Clothing
And Everything for Safety

THE STRONG, KENNARD & NUTT Co.,
2044 E. 9th Street Cleveland, Ohio.

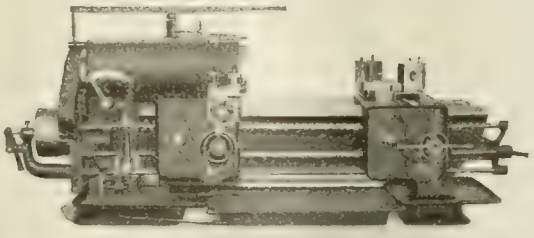
INDUSTRIAL
MILITARY
AND MARINE

WILLSON SAFETY GOGGLES

ONE PAIR
OR 20,000
PER DAY

WRITE FOR DETAILS

T.A Willson & Co., Inc. Canadian Office, 23 Scott St., Toronto



LET US TELL YOU ABOUT THIS MACHINE

Send Us Prints of Your Work

STEINLE TURRET MACHINE CO.

MADISON, WIS., U.S.A.

TRY THE STEINLE WAY

National High Speed Cutters

(The Cutter that gives service)

Let me quote you on your next requisition

Drills

High Speed and Carbon

Immediate shipment and right price.

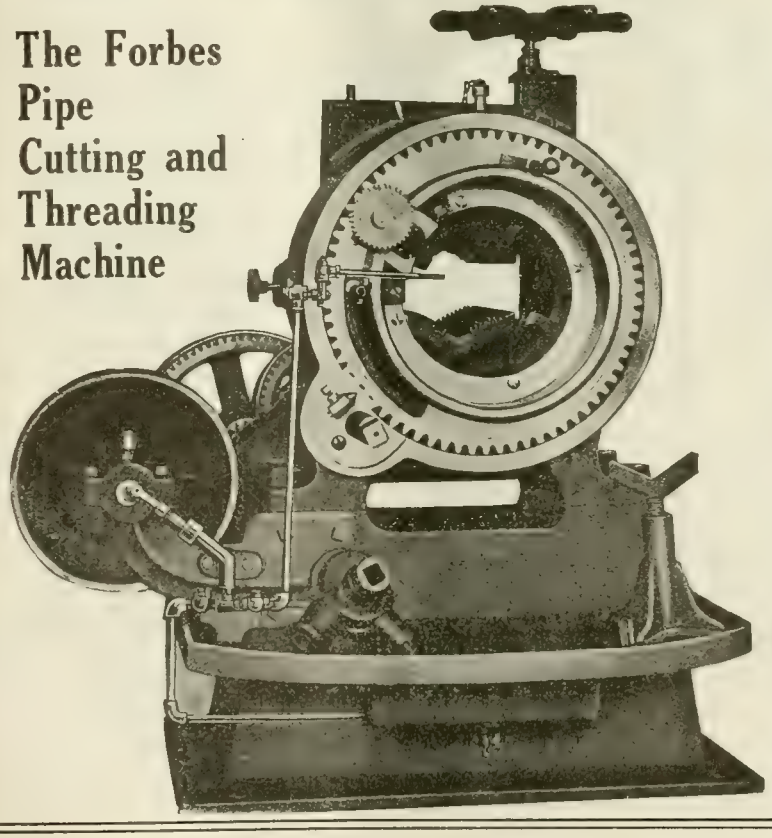
J. A. M. TAYLOR

Machine Shop Supplies

Main 786 318 Stair Bldg., Toronto

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.

Garden Street, Bridgeport, Connecticut, U.S.A.

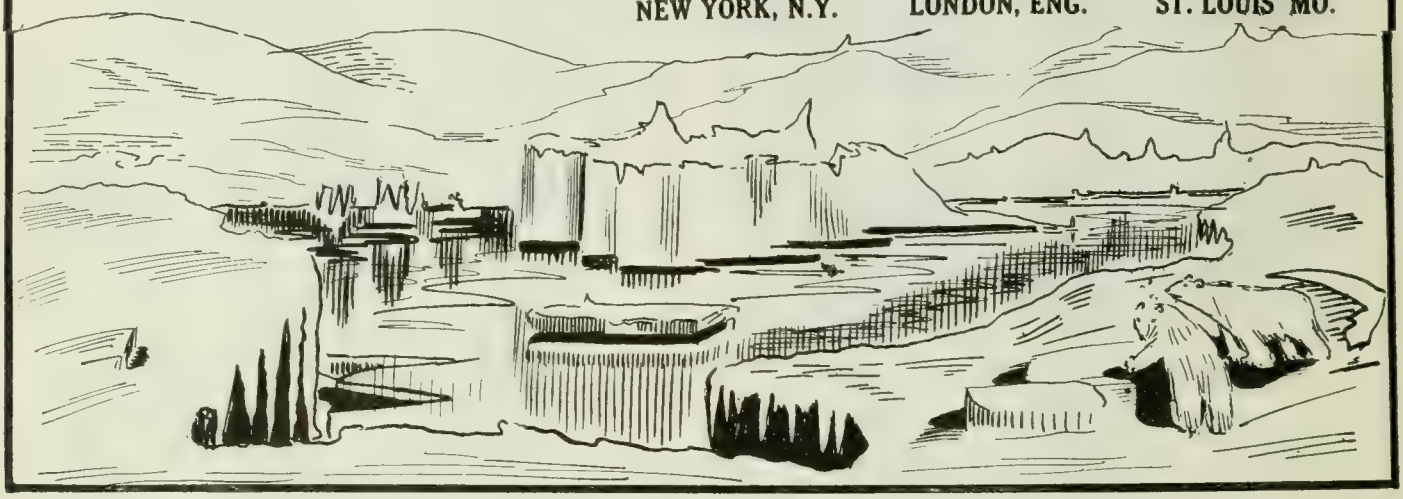
What if it is cold in your factory?

Mr. Manufacturer, if you were using Hoyt's Frost King Babbitt in your machinery bearings you wouldn't worry about the damage the cold might accomplish. Frost King can stand more chilly weather than an Eskimo and it'll keep your factory wheels turning steadily and smoothly in the frostiest weather known.

Try Frost King in the coldest part of your establishment. That's a test for any metal, but Frost King will make good.

HOYT METAL CO., Toronto

NEW YORK, N.Y. LONDON, ENG. ST. LOUIS MO.



Thor

UNIVERSAL Electric Drills

If ever you needed speedy tools, it is to-day. For you are paying your men high wages and aside from profits, anyway, the speedy tool is the better patriot.

Thor Universal Electric Drills, licensed under Burke's Universal Motor Patent, will enable your men to do more work and to do it well. These drills are most durable because practically fool-proof and because built with ample strength in every part to stand hardest service.

Five sizes, ¼″ to 9-16″ capacity, are ready for immediate delivery.

Write to-day.

Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.
Toronto: 32 Front St. W. Winnipeg: 123 Bannatyne Ave. E.
Vancouver: 1142 Homer St.

Your Riveting?

How is it done? Are you getting the necessary speed? Is the quality of the highest character? How much is it costing you?

The Grant Rivet Machine has established the records of one clean, perfectly finished rivet per second. Is that speedy enough, or is it too speedy? This is the fastest any similar machine will work and if too speedy it could be worked in conjunction with some other work. Our catalogue is worth writing for. There is one for you.

THE GRANT Mfg. & Machine Company

Holland Ave.
BRIDGEPORT, CONN.

Canadian Machinery BUYERS DIRECTORY

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

ABRASIVE MATERIALS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Rice, Lewis & Son, Toronto, Ont.

ACETYLENE
Carter Welding Co., Toronto, Ont.
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.

ACETYLENE GENERATORS
Prest-O-Lite Co., Inc., Toronto, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.

AIR CYLINDERS
Smalley-General Co., Inc., Bay City, Mich.

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Canadian Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM
Canada Metal Co., Toronto.
United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton.

ALLOY, STEEL
Armstrong, Whitworth, of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal Que.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Standard Alloys Company Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ALTERNATING CURRENT, ELECTRIC WELDING EQUIPMENT
Arcwell Corporation of Can., Toronto, Ont.

ARBORS
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
J. C. Wilson & Co., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Co., Walkerville, Ont.
Sheldons Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Canadian Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
National Acme Co., Cleveland, O., and Windsor.
Riverside Machinery Depot, Detroit, Mich.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Can.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BABBITT METAL
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
Tolland Mfg. Co., Montreal, Que.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto

BALLS, STEEL
Boker & Co., Inc., Montreal, Que.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie, Ont.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Rice, Lewis & Son, Toronto, Ont.

BELTING, BALATA
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Welding Works, Montreal, Que.
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.

BELTING, CONVEYOR
Baxter & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Welding Works, Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal, Que
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, STITCHED COTTON DUCK
Canadian Welding Works, Montreal, Que.
Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

BELTING, WOVEN
Baxter & Co., Ltd., J. R., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING ROLLS (PLUTE & AUGH)
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertram & Sons Co., John, Dundas
Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.

BLASTING MACHINES, SAND
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie, Ont.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.

BLOW PIPES AND REGULATORS
Canadian Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY
Commercial Camera Co., Province, R.I.
Mulliner-Edlund Tool Co., Syracuse, N.Y
Wickes Bros., Saginaw, Mich.

BOARTZ
Anderson & Co. of Canada, Geo., Montreal, Que.
Joyce, Koebel & Co., Inc., New York.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
Riverside Machinery Depot, Detroit, Mich.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead, Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BOLT THREADING MACHINERY
Jardine & Co., Ltd., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis
Foss Mchy. & Supply Co., The Geo. F., Montreal
Niles-Bement-Pond Co., New York.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio.
New Br'tain Mach. Co., New Britain, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont.

BRASS AND COPPER BARS, RODS AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRIQUET-INGOTS
Eastern Block Corporation, Chicago, Ill.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Tolland Mfg. Co., Montreal, Que.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananogue, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co, Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBONIZING BOXES
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glasseo, Montreal.

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Marsh Engineering Works, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS, STEEL BODY
Marsh Engineering Works, Belleville, Ont.

CASTINGS, MACHINERY
Tolland Mfg. Co., Montreal, Que.
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Algoma Steel Corp., Sault Ste. Marie, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.
Tolland Mfg. Co., Montreal, Que.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ROUGH
Tolland Mfg. Co., Montreal, Que.

CASTINGS, NICHROME
Can. Driver-Harris Co., Harrison, N.J.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont.
Wright Mfg. Co., Lisbon, Ohio.

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto.

CHESTS, TOOL
Mechanics Tool Chest Co., Toronto.

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y.
General Steel Co., Milwaukee, Wis.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Smalley-General Co., Inc., Bay City, Mich.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.

CLAMPS
Preston Woodworking Machine Co., Preston, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Manufacturers' Equipment Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lund Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found'g & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co, Harvey, Ill.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

A SPRINTER

WOULD NEVER BE SELECTED FOR A DISTANCE RUN. A TOOL MAKING OCCASIONAL SPECTACULAR PERFORMANCES HAS NO LEGITIMATE PLACE IN YOUR EQUIPMENT. THE STEADY DAY-BY-DAY PRODUCER THAT CAN ALWAYS BE DEPENDED UPON IS THE ONLY TOOL TO OWN AND, BY THE WAY,

"MORSE" TOOLS

HAVE A REPUTATION OF BEING THAT KIND

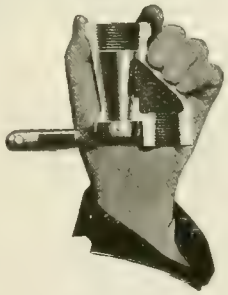
MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDEORD MASS., U.S.A.

Cleco AIR HOSE Fittings

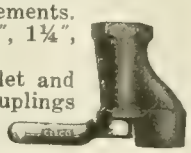
We furnish everything required from the Pipe to the Pneumatic Tool

Cleco AIR SEATED VALVES, NEVER SLIP HOSE CLAMPS, MENDER CLAMPS, AIR HOSE COUPLINGS, NIPPLES, ETC.



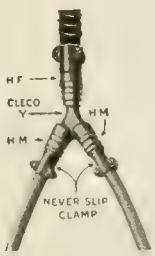
Cleco Air Seated Valves

have one-piece body valve plug and handle. No packing required as the valve plug is air-seated. Made in five sizes to suit all requirements. Style P.O., made in following sizes standard pipe thread—¾", 1", 1¼", 1½", 2", 2½" inlets and ½", ¾", 1", 1¼", 1½", 2" outlets.
Style F.O. is made in one size only—1" standard pipe thread inlet and female Bowes coupling outlet and interchanges with Bowes couplings everywhere on the line or in the shop or yard.



CLECO "Y" HOSE FITTINGS

Are made in four styles with male or female outlets or inlets and interchange with Bowes male or female coupling ends; sizes ¼" to ¾" inclusive. The two "Y" fittings illustrated are the plain style. The other two styles are each equipped with a valve having same features as Cleco Air Valves described above.



BOWES AIR HOSE COUPLINGS

Over 2,500,000 in General Use

Instantly Connected or Disconnected

Absolutely Air Tight under all pressures

Write for Bulletin and Price Sheet No. 38

CLEVELAND PNEUMATIC TOOL CO. of Canada, Limited

84 Chestnut Street, Toronto, Ont.

A. R. Williams Machinery Co., Toronto

Williams & Wilson, Montreal

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found'a & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
J. C. Wilson & Co., Belleville, Ont.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUCIBLES
Hyde Engineering Co., Montreal, Que.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLA BLOCKS
Hyde Engineering Co., Montreal, Que.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co , New York.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING AND WELDING PLANTS
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co, Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford Smith Machine Co., Hamilton, Ont.
Jovce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch Co., New Bedford, Mass
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh Engineering Works, Belleville, Ont.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.

DIE SINKERS
Becker Milling Machine Co., Boston Mass.
Garvin Machine Co., New York
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich
Wells Brothers Co. of Canada, Galt, Ont.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que
Firth & Sons, Thos., Montreal, Que.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lund-Farquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Millers Falls Co., Millers Falls, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

A NEW BRITAIN ALL-STEEL BENCH DRAWER

—is provided with stops, which permit complete exposure without danger of spilling contents.

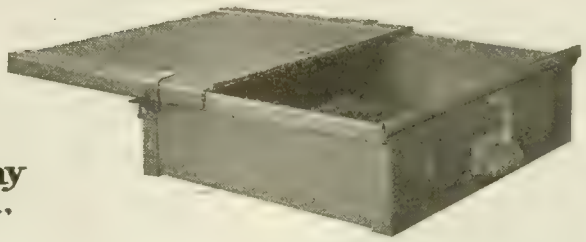
—is equipped with a solid sheet metal top, which prohibits tempering at the rear and excludes any oil or water that might by accident soak through from above.

—is fitted with cylinder lock, master keyed if desired.

—is sold as a unit, requires no fitting, and is easily and quickly applied.

More fully described in Bulletin No. 1202-A.

Write for it to-day!



The New Britain Machine Company

"Shop Furniture Originators" New Britain, Conn. U.S.A.

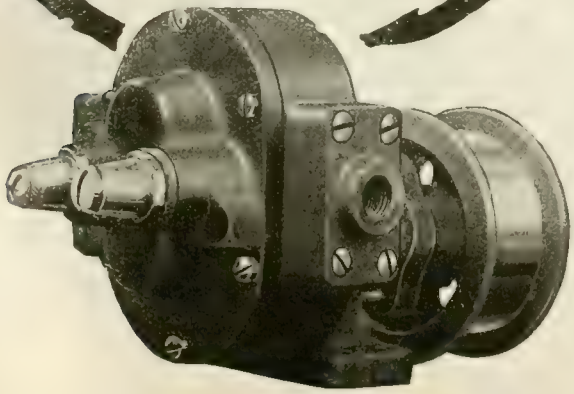
Machinery Maufacturers should equip their machines with

TRAHERN
Rotary Geared Pumps

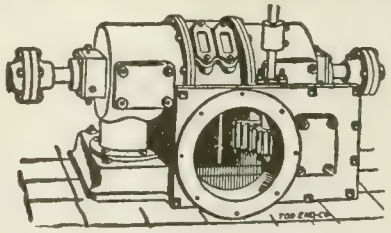
They are easily attached and add to the attractiveness and value of the machine. Operate with equal efficiency and economy in water or oil. Automatic Relief Valve permits supply being cut off at discharge without stopping pump.

Get in touch with us about prices and samples

TRAHERN PUMP COMPANY
ROCKFORD, ILLINOIS
Canadian Agents:
A. R. Williams Machinery Co.
Toronto



WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Millers Falls Co., Millers Falls, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Ltd., Montreal, Que.

EFFICIENCY ENGINEERING SERVICE
Anderson's Efficiency Service, Toronto, Ont.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.

ELEVATOR ENCLOSURES
Canada Wire & Iron Goods Co., Hamilton, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Baxter & Co., Ltd., J. R., Montreal, Que.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES
Brewster Co., Wm., New York, N.Y.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.

EXTRUSION DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL
J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont
United Brass & Lead, Ltd., Toronto.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.

FENCE, IRON AND FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Port Hope File Mfg. Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILTERS, OIL
Bowser & Co., Inc., S. F., Toronto, Ont.

FIRE BRICK
Hyde Engineering Co., Montreal, Que.

FIRE CLAY
Hyde Engineering Co., Montreal, Que.

FIRE ESCAPES
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

FITTINGS, MALLEABLE AND CAST IRON
Fittings, Ltd., Oshawa, Ont.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FLINT SHOT
U.S. Silica Co., Chicago, Ill.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON
Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE

FORGING AND WELDING
Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.

FORGINGS, SPECIAL
Armstrong, Whitworth of Canada, Montreal, Que.
Williams & Co., J. H., Brooklyn, N.Y.

FOUNDRY SUPPLIES
Hyde Engineering Co., Montreal, Que.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FUEL OIL SYSTEMS
Gilbert & Barker Mfg. Co., Springfield, Mass.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

FURNACES, BLAST
Belleview Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, BRASS, MALLEABLE
Whiting Foundry Equipment Co., Harvey, Ill.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.
Strong-Carlyle-Hammond, Cleveland, O.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.

GALVANIZING MACHINERY
Erie Foundry Co., Erie, Pa.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 308 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Hyde Engineering Works, Montreal, Que.
The Smart-Turner Machine Co., Hamilton, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gishoit Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

A Time Saver—
Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

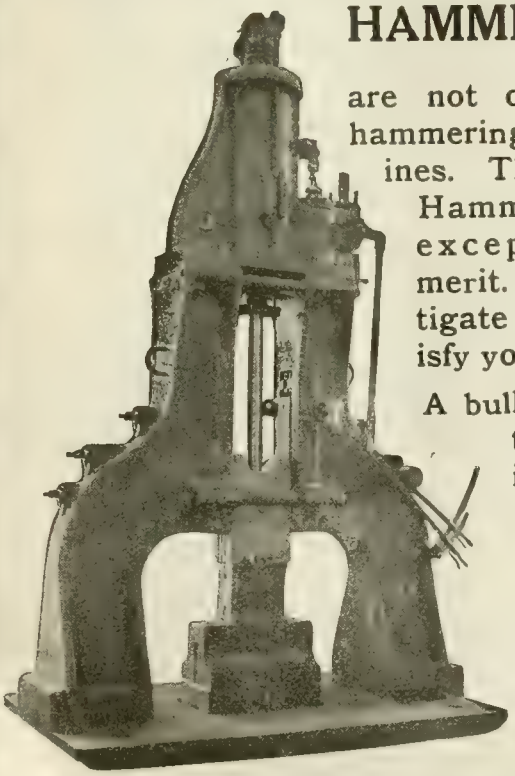
If you break it we will furnish a new one free of charge.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

"ERIE" STEAM FORGING HAMMERS



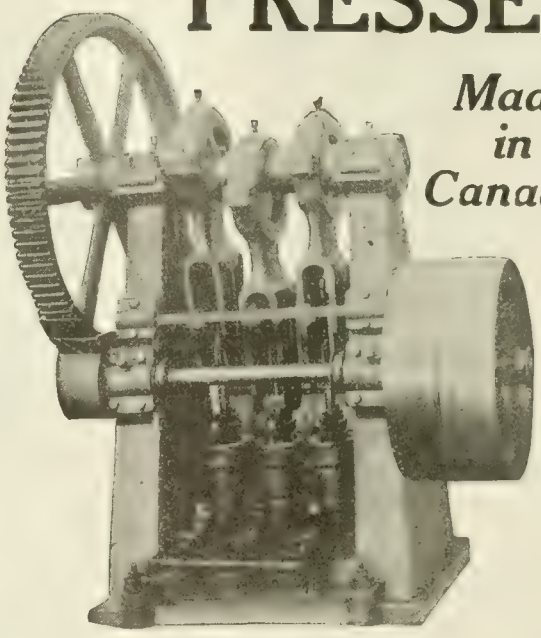
are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U. S. A.

PRESSES

Made in Canada



Hydraulic Presses, Pumps and Accumulators for all purposes

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont
Philadelphia Gear Works, Philadelphia, Pa.
The Smart-Turner Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

GENERATORS, ELECTRIC
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR
MacGovern & Co., Montreal, Que.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNORS, PUMP
Foster Engineering Co., Newark, N.J.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy & Supplies, Ltd., Montreal, Que

GOGGLES
Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kenard & Nutt Co., Cleveland, Ohio
Willson & Co., Inc., T. A., Reading, Pa.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASES (SEE LUBRICANTS)
GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co. Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond Mach. Tool Co., R. K., Cincinnati, O
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE AND CHASER
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
United States Electrical Tool Co., Cincinati, O.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.

GRINDING MACHINES, BENCH AND FLOOR
St. Louis Mach. Tool Co., St. Louis.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ford-Smith Machine Co., Hamilton, Ont.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Greenfield Machine Co., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.
Modern Tool Co., Erie, Pa.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Reed-Prentice Co., Worcester, Mass.
Wing & Son, J. E., Hamilton, Ont.
Gisholt Machine Co., Madison, Wis.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.
Wisconsin Electric Co., Racine, Wis.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mahcine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Norton Co., Worcester, Mass.

GRIT, ANGULAR
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
GUARDS, WINDOW AND MACHINE
Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.
Page Steel & Wire Co., Adrian, Mich.

HANDLES, BALANCE, CRANK AND MACHINE
Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Ford-Smith Machine Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Millers Falls Co., Millers Falls, Mass.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton, Ont.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Millers Falls Co., Millers Falls, Mass.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.

HACK SAWS, POWER
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Works, Buffalo, N.Y.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
McKenzie Machy. Co., D., Guelph, Ont.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
Racine Tool & Mach. Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

HAMMERS
Canada Foundries & Forgings, Ltd., Welland, Ont.

HAMMERS, AIR
Erie Foundry Co., Erie, Pa.

HAMMERS (DROP), MOTOR AND BELT DRIVEN
Beaudry & Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh Pa.

HAMMERS, NAIL MACHINE
Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston Mass.

HAMMERS, STEAM
Canada Machinery Corp., Galt, Ont
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAMMERS, SHELL NOSING
Beaudry & Company, Inc., Boston, Mass.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

HANGERS, SHAFT
Algoma Steel Corp., Sault Ste. Marie, Ont.
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Jones & Glassco, Montreal.
Standard Pressed Steel Co., Philadelphia, Pa.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HIGH SPEED STEEL
J. F. A. Comstedt, New York City, N.Y.

HIGH SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.
J. F. A. Comstedt, New York City, N.Y.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

HOBS, MILLING

HOISTS, AIR
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Jones & Glassco, Montreal.
MacGovern & Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, CHAIN AND PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Marsh Engineering Works, Ltd., Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Wright Mfg. Co., Lisbon, Ohio.

HOISTS, ELECTRIC
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
Electric Steels & Metals, Ltd., Welland, Ont.
Pollard Mfg. Co., Niagara Falls, Ont.
Kennedy & Sons, Owen Sound, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

HOLDERS, ELECTRIC
Electric Steels & Metals, Ltd., Welland, Ont.

HOPPERS
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Dominion Bridge Co., Montreal, Quebec.
Toronto Iron Works, Ltd., Toronto Ont.

THE "NEW" MACLEAN'S

Starting with the January issue, MACLEAN'S MAGAZINE comes out in a new size—11 x 14¼—same size as *The Saturday Evening Post.* This change will enable us to give readers more entertaining articles and stories, and a very much enlarged "Review of Reviews" Section. You will find this January issue of MACLEAN'S more pleasing and instructive than the great majority of magazines you find displayed on news-stands—and

contents are carefully censored—no sex stories—you can take it into your home with the utmost confidence.

A word about the contents—

"Why Laurier Will Wait"

In discussing the policy of the Liberal leader during the coming session of Parliament, J. K. Munro predicts, in January MACLEAN'S, that Laurier will allow Union Government a free hand. In this policy of inactivity "he sees the way open to the accomplishment of all his purposes. If he is half the politician his friends believe he is, he will sit and smile and wait—yet a little longer."

All Canada is interested in what is going to happen in Ottawa. J. K. Munro, veteran press gallery man, is a shrewd observer, and his political articles in MACLEAN'S have stirred up more comment than anything else appearing in the press of the country. He knows politics from the inside. "Why Laurier Will Wait" is a forecast of the near future that bristles with interesting points. A few of the other "head-liners" in this issue:

Bolsheviks at Work in Canada
A sensational article on activities in subterranean circles. There are foreigners in Canada ready to wave the red flag.

Achievements of the Canadian Army
Since the Canadian Division was formed, they have not retired a foot nor lost a gun—a marvellous record. An inside story of how this great army was handled and controlled is told by H. F. Gadsby who spent a month at Headquarters during the last great offensive.

The Grave Dangers of Peace
An article by Agnes C. Laut on the insidious new propaganda being launched by the Germans to split the Allies.

Jock in a Juggernaut
The most interesting war article in a long while, because it is new—it deals with experiences in the tanks.

AND THESE AS WELL:

The Dance Halls of Dawson - By E. Ward Smith

My Hour - - - By Robert W. Service

The Strange Adventure of a Rialto Rainstorm - By Arthur Stringer

The Minx Goes to the Front - - - By C. N. and A. M. Williamson

The Three Sapphires - - By W. A. Fraser

Mr. Craighouse, of New York, Satirist - - By Arthur Beverley Baxter

The Intercepting Spark, by Mary Josephine Benson

Over 65,000 Canadian Families Buy

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

20c PER COPY. $2.00 PER YEAR. A TRIAL! 6 MONTHS FOR $1.00

MACLEAN'S sells for $2 a year—should be more. We want you to get acquainted with MACLEAN'S, for we know that after we once introduce you to "Canada's National Magazine" you two are going to be friends for life. So, to make you known to each other, we will accept your subscription now for only six months to start off with. In other words, we want you to "try out" MACLEAN'S, and see for yourself just how good it is!

Don't miss this unusual opportunity. Simply sign the coupon, pin a postal note to it, and mail it to us.

TO-DAY

Tear off here and mail
The MacLean Publishing Company,
143 University Ave.,
Toronto, Ontario.

I accept your offer. I am enclosing $1.00 to pay for MACLEAN'S MAGAZINE for six full months. Please start me off with the big January issue.

Name .....

Address .....

HOSE, PNEUMATIC
Baxter & Co., Ltd., J. R., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, SAND BLAST
Gutta Percha & Rubber, Ltd., Toronto, Can.
Panghorn Corporation, Hagerstown, Md.

HOSE, STEAM
Gutta Percha & Rubber, Ltd., Toronto, Ont

HYDRAULIC MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.

HYDROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGROMETERS
Taylor Instrument Co., Rochester, N.Y.

HYGRODEIKS
Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R. I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.

INDICATING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

INGOT METAL
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
United Brass & Lead Ltd., Toronto.

INGOTS, STEEL
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

INSTRUMENTS, ENGINEERING
Consolidated Optical Co., Toronto, Ont.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

IRON SAND
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

IRON, WROUGHT, ROLLED AND PIG
Swedish Steel & Importing Co., Ltd., Montreal

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Canadian Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.
Normac Machine Co., St. Catharines, Ont

JOURNAL WEDGES
Canada Foundries & Forgings, Ltd., Welland, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pt.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LADLES, FOUNDRY
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LAMPS, INCANDESCENT AND NITROGEN
Can. Laco-Philips Co., Toronto, Ont.

LAMPS, TUNGSTEN
Can. Laco-Philips Co., Toronto, Ont.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.
Wood Turret Machine Co., Brazil, Ind.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, BORING
Bridgeford Mach. Tool Wks., Rochester, N.Y.
Stand. Machy. & Supplies, Ltd., Montreal, Que.

LATHES, PRECISION, BENCH
W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.

LATHES, BAND TURNING
Roelofson Machine & Tool Co., Toronto, Ont.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.
Hardinge Bros., Inc., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, Ohio.
Cincinnati Lathe & Tool Co., Cincinnati, O.
Wickes Bros., Saginaw, Mich.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Kennedy & Sons, Wm., Owen Sound, Ont.
R. McDougall Co., Galt.
Miles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.
Riverside Machinery Depot, Detroit, Mich.
Smalley-General Co., Inc., Bay City, Mich.
Sidney Tool Co., Sidney, Ohio.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blasdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, METAL TURNING
Fittings, Ltd., Oshawa, Ont.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Wood Turret Machine Co., Brazil, Ind.
Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.

LATHES, SINGLE PURPOSE
Baxter & Co., Ltd., J. R., Montreal, Que.
Bertram John & Sons Co., Dundas Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Plessisville Foundry, Plessisville, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
W. T. Whitehead, Son & Co., Montreal, Que.
Wood Turret Machine Co., Brazil, Ind.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Wickes Bros., Saginaw, Mich.
Hepburn, John T., Ltd., Toronto.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Wood Turret Machine Co., Brazil, Ind.

LATHES, SPINNING
Bliss, E. W., Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.

LATHES, TURRET, HAND, HORIZONTAL
Acme Machine Tool Co., Cincinnati, Ohio.
Bertram John, & Sons Co. Dundas Ont.
Rivett Lathe & Grinder Co., Boston, Mass.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co. Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Mullmer-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich
Standard Machy. & Supplies, Ltd., Montreal, Que.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

LEAD BURNING
St. Lawrence Welding Co., Montreal, Que.
Canadian Welding Works, Montreal, Que.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIFTS, PNEUMATIC
Whiting Foundry Equipment Co., Harvey, Ill.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

LOADERS, WAGON AND TRUCK
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ontario.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.
Elm Cutting Oil Co., Toronto, Ont.
Ontario Lubricating Co., Hamilton, Ont.

LUBRICATORS
Trahern Pump Co., Rockford, Ill.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal, Que.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
The Geo. N. Foss Mchy. & Supply Co., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson Ltd., Montreal, Que

MACHINERY, HAMMER AND NAIL
Garlock-Walker Machinery Co., Toronto, Ont.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Marten Mach. Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
MacGovern & Co., Montreal, Que.
Starrett Co., L. S., Athol, Mass.
J. H. Williams & Co., Brooklyn, N.Y.

MACHINE TOOLS
Cincinnati Lathe & Tool Co., Cincinnati, O.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Perrin, Wm. R., Toronto.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Toronto Testing Laboratory, Ltd., Toronto.

METAL SAWS
Simonds Mfg. Co., Fitchburg, Mass.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Enushevsky & Son, B., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
United Brass & Lead Ltd., Toronto.

METERS, OIL, WATER
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram, John, & Sons Co., Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.

The Financial Post on Business Government

"LET us demand that the standard of efficiency in the Government be raised to the highest possible point by the calling in of more of the business executives of the country to take the place of the arm-chair politicians who win to position by the ability to win votes rather than to serve the interests of voters. Let these men assist in the negotiations for reconstruction business from Europe, the financing of such orders on a business basis, the establishment of proper trade relations with foreign markets, the readjustment of taxation and the tariff to a more intelligent basis in relation to individual industries, the efficient demobilization of the soldier and other problems of policy, but let every individual meet for himself those other problems which concern those whose welfare depends upon him and solve them to the best of his ability. Reconstruction begins at home. Let us have confidence in ourselves."

Beside the vigorous leading article from which the above is quoted,

The Post Review and Outlook Number This Week Contains:

The following special articles prepared by members of the staff of THE FINANCIAL POST *and of associate publications in the MacLean group of Specialized Business Newspapers.*

Peace Brightens Prospects for Loan Companies.
Hydro Reviewed for Maine People.
Canadian Car Earned Enough to Wipe Out Arrears.
Want Increase Considered on Per Cent. Basis.
Imperial Oil's Plan Based on Dollars and Cents.
Smaller Net Profits by Consolidated Smelters.
Decline in Net Earnings of C. P. R.
Bank Clearings Again Ahead of Last Year.
Meeting Client on His Individual Business Ground.
Bankers Looking to the Far East.
Should Banks Buy Victory Bonds?
Using the Trade Acceptance in Retail Business.
Edmonton Bond Dealer Sentenced.
Bond Market Has Been Quiet But Very Strong.
Liquidation of Life Company May Be Probed.
N. F. U. Organizes Loss Information Service Bureau.

(SPECIAL SECTION)

The Government is Organizing a Comprehensive Machine for the Repatriation of Canada's Army.
Let Us Have Confidence in Ourselves—Editorial.
Banks Are Blazing the Trail for Development of Export Trade in Markets of the World.
Opportunity for United States to Play Part of "Big Sister" to Canada in a Financial Way.
Not So Much a Problem of Who Will Emigrate, But Who Will Prove Desirable to Canada.
The Business of Bringing the Boys Back Home.
Canada's Borrowings During 1918 Reach a Total that Establishes a New Record.
Bond Market Has Experienced Peculiar Year
Beating Swords of War Into Plow Shares of Peace.
British Can Build Cheaper Vessels Than Canadians.
War and the "Flu" Cause Abnormal Death Claims.
Canada's Banks and Question of Larger Capital.
Now the Stock Exchanges are Taking the Rough Jolts Out of Financial Reconstruction.
Canada Made a Remarkable Record in the Production of Shells and Other Munitions.
The Menace of the Bolsheviki! Insidious Influences Threaten Relations.
Price of Wheat and Production of Livestock.
Comparative Price Records of Canadian Securities for Past Eight Years.
Activity in Renting Workingmen's Houses and in Dealings in Farm Lands Distinguishes Realty Market.
Steel Is King When Nation Goes to War.
Canada's Exports and Their Part in Beating the Hun.
January Dividend Payments.
Canada's Part in Beating the Submarine Peril

Above mentioned are a few of the more important contents of this issue of THE FINANCIAL POST. Send a subscription to THE POST and note its business value to you. Use this form in sending subscription, which is $3.00 per year.

The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week, beginning with the Review and Outlook Number, 1919, till further ordered. I will pay subscription price, $3.00 per year, on receipt of bill, or you may draw on me for this.

Name.....

Address.....

.....

C.M.

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
National Acme Co., Cleveland, Ohio.
Cincinnati Automatic Mach. Co., Cincinnati, O
New Britain Machine Co., New Britain, Conn
Riverside Machinery Depot, Detroit, Mach.

SCREWS
Can. B. K. Morton, Toronto, Montreal
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
The Geo. E. Foss Mchy. & Supply Co., Montreal
Riverside Machinery Depot, Detroit, Mich.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. E. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.

SHARPENING STONES
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas
Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
John Bertram & Sons Co., Dundas
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
A. B. Jardine & Co., Limited, Hespeler, Ont
National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
Stoll Co., Inc., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Stoll Co., D. H., Buffalo, N.Y.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont

SHELL BANDING MACHINES, HYDRAULIC
Garlock-Walker Machy. Co., Ltd., Toronto, Ont
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHEET METAL WORKING MACHINERY
Stoll Co., Inc., D. H., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London, Ontario.

SHELL PAINTING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y.

SHOP FURNITURE
Dennis Wire & Iron Works, London, Ontario.
New Britain Mach. Co., New Britain, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal.
Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Quebec.
Marsh Engineering Works, Belleville, Ont.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford Mass
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead, Ltd., Toronto

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Bearer Engineering Co., Montreal, Que.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach & Tool Co., Galt, On
Ferracute Mach. Co., Bridgeton, N.J.
Foot-Smith Machine Co., Hamilton, Ont
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Edlund Tool Co., Syracuse, N.Y
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co. Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont
Wilson & Co., J. C., Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
Can Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

STAIRS, IRON
Can. Welding Works, Montreal, Que.
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM and STEEL
Dom. Forge & Stamping Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, CRUCIBLE TOOL
Hammond Steel Co., Inc., Syracuse, N.Y.
Illingworth Steel Co., John, New York, N.Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Canada, Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL CASTINGS
Joliette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound, Ont.
Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
Firth & Sons, Thos., Montreal, Que.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que

STEEL, SPECIAL ELECTRIC ALLOY
Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
Armstrong, Whitworth of Canada, Montreal, Que
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
New Britain Machine Co., New Britain, Conn.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

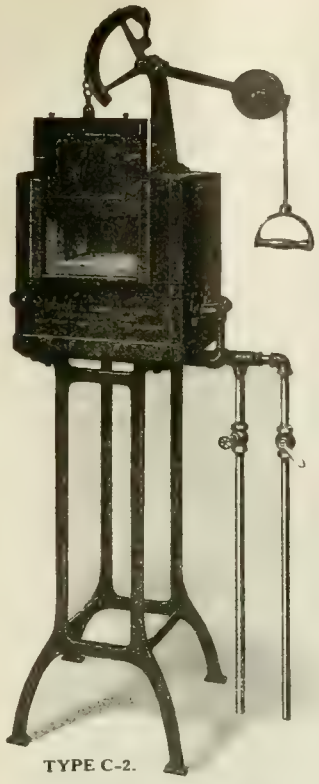
STRAND
Page Steel & Wire Co., Adrian, Mich.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Pangborn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PENUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.



TYPE C-2.

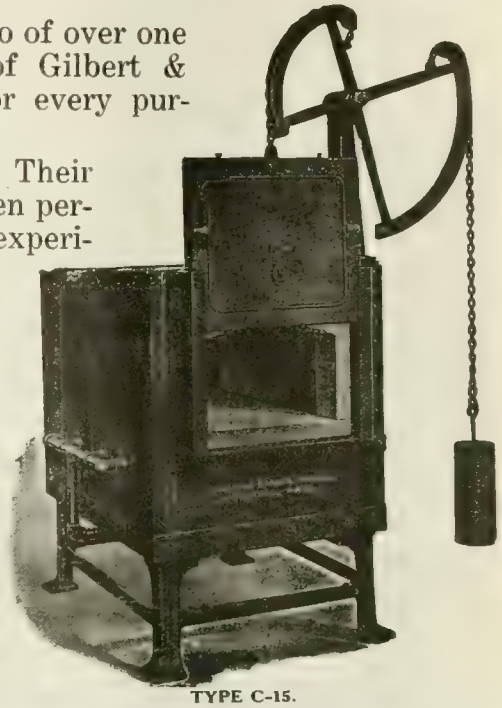
The Right Furnace For Every Purpose

THE types shown are only two of over one hundred types and sizes of Gilbert & Barker Furnaces—a furnace for every purpose.

G. & B. Furnaces are built right. Their construction and design have been perfected by our half century of experience.

We offer you the benefit of this experience and thorough knowledge of modern heat-treating methods through our engineering department. The service is free. Put your problems up to us.

Just now we are making prompt delivery of these two types and many others. Send for Stock List 24.



TYPE C-15.

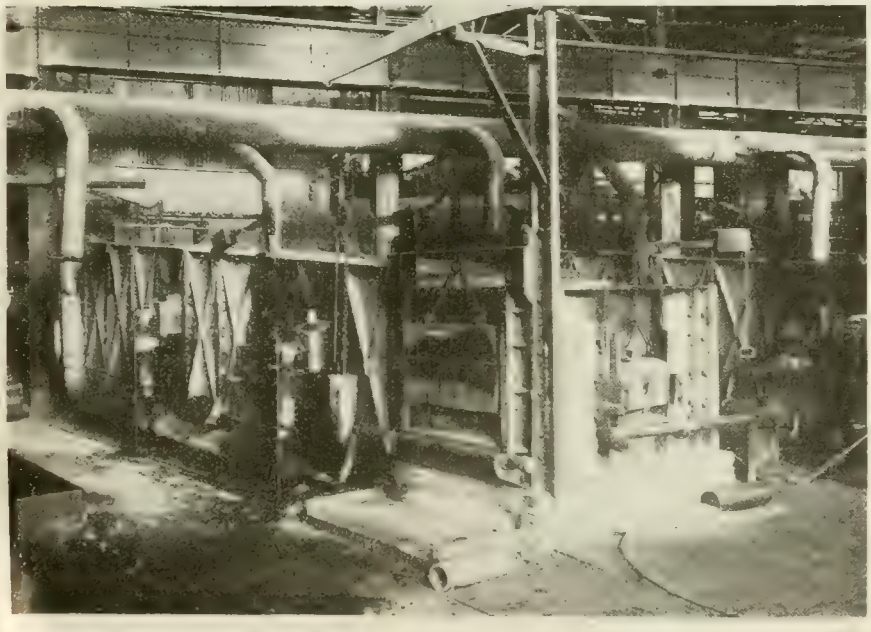
Gilbert & Barker Mfg. Co. West Springfield Mass.

Canadian Agents: Williams & Wilson, Montreal, Que.

New York Office: Room 1107, 26 Broadway

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering

Company, Limited

Three Rivers, Quebec, Canada

TANKS, GASOLINE AND OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Canadian Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.

TANKS, STEEL, WATER PRESSURE
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Welding Works, Montreal, Que.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TANK WAGONS
Canadian Welding Works, Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice, Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John, & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York
Rickert-Shafer Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.

TAPS, ADJUSTABLE
Baxter Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo F. Foss Mchy. & Supply Co., Montreal.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

TAP EXTENSIONS
Allen Mfg. Co., Hartford, Conn.

TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS METALLURGICAL
Shore Instrument & Mfg. Co., New York City.

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

THREADING TOOLS
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

THUMB SCREWS AND NUTS
Canada Found'n & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto
Williams & Co., J. H., Brooklyn, N.Y.

TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.

TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont.

TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Mechanics' Tool Case Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, LUMBERING
Thos. Pink & Co., Pembroke, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill
Stow Mfg. Co., Binghamton, N.Y.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machinery Co., St. Louis, Mo
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.

TRANSMISSION ROPE
Jones & Glassco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo
Dominion Bridge Co., Montreal, Quebec
MacKinnon Steel Co., Sherbrooke, Quebec.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fence Co., Woodstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES
Brown & Sharpe Mfg. Co., Providence
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.
Riverside Machinery Depot, Detroit, Mich.

TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont.
Rice, Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VALVES, FLOAT
Foster Engineering Co., Newark, N.J.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
A. R. Williams Machy. Co., Toronto.

VISE STANDS, PORTABLE
New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
The Geo. F. Foss Mchy. & Supply Co., Montreal
New Britain Machine Co., New Britain, Conn.

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WASTE
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wood Turret Machine Co., Brazil, Ind

WATER-INTAKE SCREENS
Can. Link-Belt Co., Toronto, Ont.

WATER CINDER MILLS
Whiting Foundry Equipment Co., Harvey, Ill.

WATER JACKETS
Can. Welding Works, Montreal, Que.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WELDING, ELECTRIC, SPOT, BUTT, ETC.
St. Lawrence Welding Co., Montreal, Que.

WELDING MASKS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT, BUTT, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

WELDING RODS AND WIRE
Page Steel & Wire Co., Adrian, Mich.

WELDING, WORK AND SUPPLIES (Autogenous and Oxy-Acetylene) see OXY-ACETYLENE

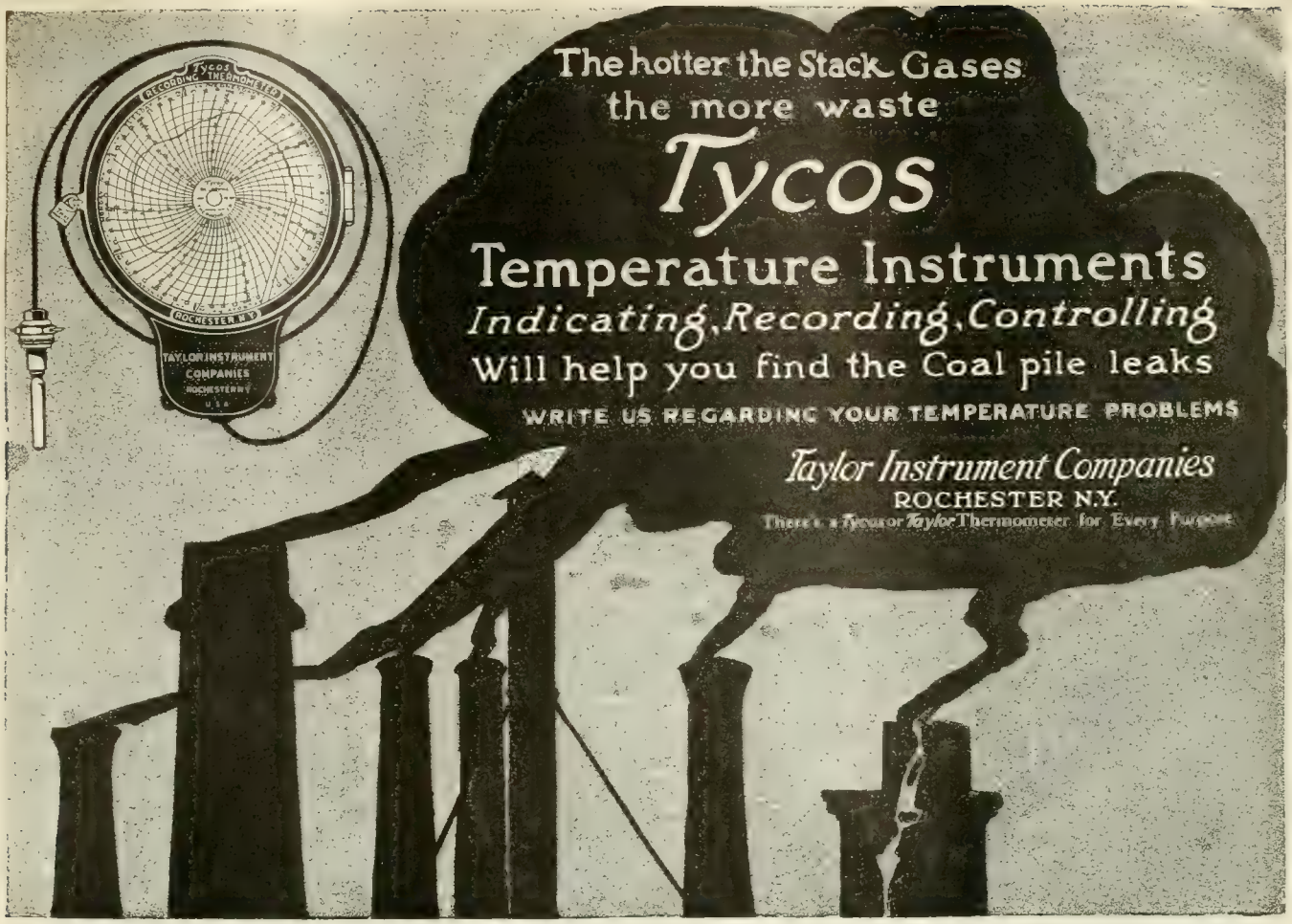
WHEELS, SPROCKET AND TRACTION
Can. Link-Belt Co., Toronto, Ont.

WHEEL TRUEING TOOLS
Anderson & Co., of Canada, Geo., Montreal, Que.
Wheel Trueing Tool Co., Windsor, Ont.

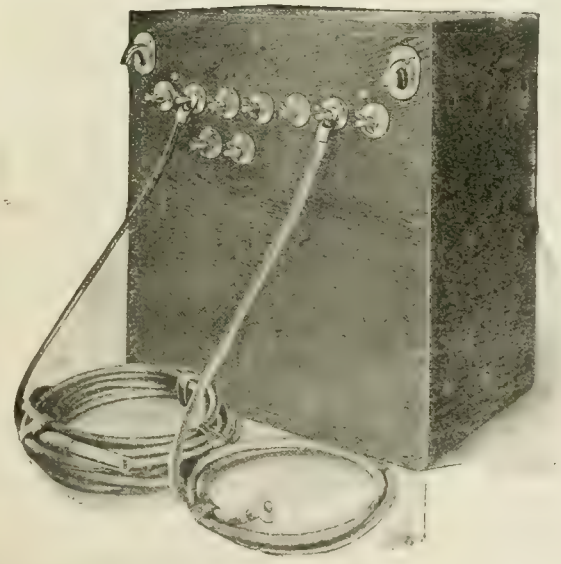
WINCHES
John H. Hall & Sons, Brantford.
Kennedy & Son, Wm., Owen Sound, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

WIRE COILING AND POINTING MACHINERY
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE RAILS
Sleeper & Hartley, Inc., Worcester, Mass.



Alternating Current Arc-Welding



The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

710 C.P.R. Building, Toronto

U.S. Office: 42 Broadway, New York City

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.

MILLING CUTTERS
Cleveland Milling Machine Co., Cleveland, O.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Steptoe Co., The, John, Cincinnati, Ohio.
W. T. Whitehead, Son, & Co., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Bocker Milling Machine Co., Boston, Mass.
Brown & Sharpe Mfg. Co., Providence.
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio
Niles-Bement-Pond Co, New York.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss, The Geo. F., Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I
Ford-Smith Mach Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Marsh Engineering Works, Belleville, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MUNTZ METAL
Brown Copper & Brass Roller Mills, New Toronto Ont.

NAILS
Page Steel & Wire Co., Adrian, Mich

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.

NICKEL
Boker & Co., Inc., H., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
J. F. A Comstedt, New York City, N.Y.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, Ohio.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
Bertram, John, & Sons Co., Dundas Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.

OILS, MOTOR
Elm Cutting Oil Co., Toronto, Ont.

OILS, DRAWING
Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS
Can. Fairbanks-Morse, Co., Montreal.
Sheldon's, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Can., Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.

OXY-ACETYLENE WELDING AND CUTTING
Can. Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Oxyweld Co., Ltd., Toronto, Ont.

OXYGEN (SEE ACETYLENE)
Canadian Welding Works, Montreal, Que.

PACKINGS, ASBESTOS
Canadian Welding Works, Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Baxter & Co., Ltd., J. R., Montreal, Que.
Graton & Knight Mfg. Co., Worcester, Mass.
Gutta Percha & Rubber, Ltd., Toronto, Can.
William R. Perrin, Ltd., Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Can. Link-Belt Co., Toronto, Ont.

PAPER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Dominion Pattern Works, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph, Ont.

PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PHOTOSTATS
Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE
Lynd-Farquhar Co., Boston.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

PLIERS
Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Quebec.

POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.

POWER HOUSE CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

PRESSERS, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Riverside Machinery Depot, Detroit, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.
Stoll Co., D. H., Buffalo, N.Y.

PRODUCTION WORK
Windsor Mach. & Tool Co., Windsor, Ont.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound, Ont.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
Algoma Steel Corp., Sault Ste. Marie, Ont.
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dodge Sales & Eng. Co., Mishamsha, Ind.
Ford-Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glassco, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn

PULP MILL MACHINERY
Hydraulic Machy. Co., Ltd., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL
Goldie & McCulloch Co., Galt, Ont.
Bowser & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

PUMPS, FUEL OIL
Bowser & Co., Inc., S. F., Toronto, Ont.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, HIGH PRESSURE
Hydraulic Machy. Co., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, HYDRAULIC
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Machy. Co., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.

PUMPS, ROTARY, POWER DRIVEN
Bowser & Co., Inc., S. F., Toronto, Ont.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, LUBRICANT, OIL, WATER
Bowser & Co., Inc., S. F., Toronto, Ont.
Fry's (London), Ltd., London, England.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Trahern Pump Co., Rockford, Ill.

PUMPS, MOTOR AND BELT DRIVEN
MacGovern & Co., Montreal, Que.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.

PUMPS, SUD
Fry's (London), Ltd., London, England.

PUMP LEATHERS
Graton & Knight Mfg. Co., Worcester, Mass.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Boker & Co., Inc., H., Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Stoll Co., D. H., Buffalo, N.Y.
Wickes & Co., Saginaw, Mich.

PUNCHES, CHROME, VANADIUM SHELL
Hammond Steel Co., Inc., Syracuse, N.Y.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Bristol Co., Waterbury, Conn., U.S.A.
Shore Instrument & Mfg. Co., New York City.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS
Can. Welding Works, Montreal, Que.
United Brass & Lead, Ltd., Toronto, Ont.

RAIL BENDERS
Algoma Steel Corp., Sault Ste. Marie, Ont.
Niles-Bement-Pond Co., New York

RADIAL DRILLING MACHINE, WALL
Lund-Farquhar Co., Boston.
Wickes & Co., Saginaw, Mich.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont.

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

ROLLER CHAINS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH WEIGHTS AND WRENCHES
Fittings, Ltd., Oshawa, Ont.

SAWS, CIRCULAR METAL
E. C. Atkins & Co., Indianapolis, Ind.
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)
E. C. Atkins & Co., Indianapolis, Ind.
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, SLITTING
E. C. Atkins & Co., Indianapolis, Ind.
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

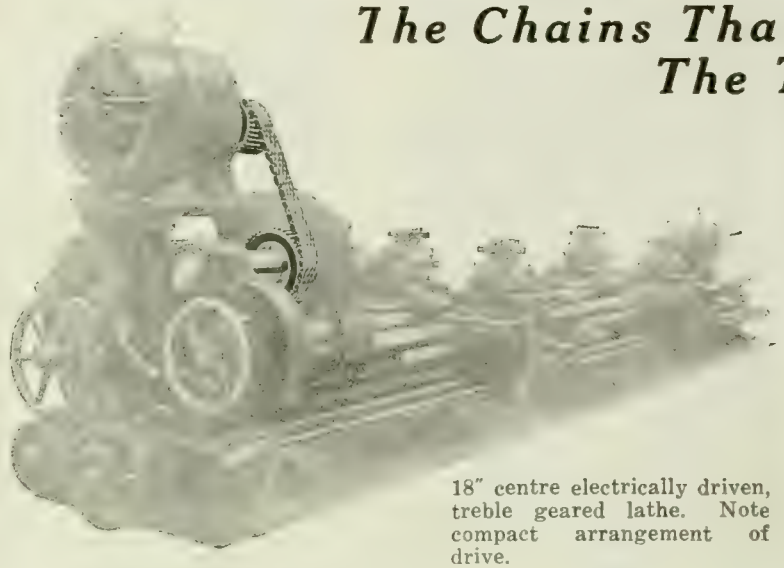
SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
Galt Machine Screw Co., Galt, Ont.
Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

"The Coventry" Chain Drives

The Chains That Carried The Tanks To Victory



18" centre electrically driven, treble geared lathe. Note compact arrangement of drive.

Advantages of Chain Transmission

Will work at a high speed and in either direction. Positive yet flexible even turning movement. Will work on centres too long for gears and too short for belts, so that drive can be arranged to suit other details of design. Unaffected by heat or cold. Give positive velocity ratio, minimise journal friction. Will transmit considerable power with high efficiency which is retained.

Increase output, give uniform quality of product, consume minimum of power. Minimum attention required for repairs or adjustment.

"THE COVENTRY" CHAIN CO., LTD., COVENTRY, ENGLAND

Cables: "Chains, Coventry" - *Codes:* A B C 4th and 4th Edns., Western Union and Marconi

When Writing Advertisers Please Mention Canadian Machinery

WIRE CLOTH AND PERFORATED METALS
Canada Wire & Iron Goods Co., Hamilton.
Page Steel & Wire Co., New York, N.Y.

WIRE FORMING AND STAMPING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada
F. B. Shuster Co., New Haven, Conn.

WIRE NAILS
Page Steel & Wire Co., New York, N.Y.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE NAIL MACHINERY
National Machy. Co., Tiffin, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Page Steel & Wire Co., New York, N.Y.

WIRE SPRING
Page Steel & Wire Co., Adrian, Mich.

WIRE STEEL, BRASS, COPPER, BRONZE
Page Steel & Wire Co., New York.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE, MUSIC
Boker & Co., Inc., H., Montreal, Que.

WORKS STANDS, PORTABLE
New Britain Mach. Co., New Britain, Conn.

WOOD BORING MACHINES
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

WIRE STRAIGHTENERS AND CUTTERS
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WOODWORKING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

WRENCHES
Williams & Co., J. H., Brooklyn, N.Y.
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCH, CHUCKS
Thomas Elevator Co., Chicago, Ill.

WOVEN STEEL PARTITIONS
Page Steel & Wire Co., Adrian, Mich.

WRENCHES, AUTOMOBILE NARROW JAW AND MONKEY
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, PIPE, MONKEY, TAP
Aikenhead Hardware Co., Toronto, Ont.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Peck, Stow & Wilcox Co., Southington, Conn.
Rice Lewis & Son, Toronto, Ont.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Keystone Mfg. Co., Buffalo, N.Y.

WRENCHES, SOCKET
Allen Mfg. Co., Hartford, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

WRENCHES, SCREW
Fittings, Ltd., Oshawa, Ont.

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI. TORONTO, JANUARY 16, 1919. No. 3

EDITORIAL CONTENTS

MANUFACTURING A MILLING AND GEAR CUTTING ATTACHMENT 51

AEROPLANE MOTORS 54

ROLLING CONCRETE REINFORCEMENT FROM OLD RAILS 59

WHAT OUR READERS THINK AND DO 62

Boring Bars and Boring Cutters.

DEVELOPMENTS IN SHOP EQUIPMENT 64

EDITORIAL 66

MARKET DEVELOPMENTS 68

Summary....Montreal Letter....Pittsburgh Letter....Washington Letter....New York Letter.

SELECTED MARKET QUOTATIONS 56

INDUSTRIAL NEWS 60

THE MACLEAN PUBLISHING COMPANY, LIMITED

JOHN BAYNE MACLEAN, Pres. H. T. HUNTER, Vice-pres. H. V. TYRRELL, Gen. Man.

Publishers of Hardware and Metal, The Financial Post, MacLean's Magazine, Farmers' Magazine, Canadian Grocer, Dry Goods Review, Men's Wear Review, Printer and Publisher, Bookseller and Stationer, Canadian Machinery and Manufacturing News, Power House, Sanitary Engineer, Canadian Foundryman, Marine Engineering of Canada.

Cable Address. Macpubco, Toronto; Atabek, London, Eng.

ESTABLISHED 1887.

CANADIAN MACHINERY AND MANUFACTURING NEWS

A. R. KENNEDY, Managing Editor. B. G. NEWTON, Manager.

Associate Editors: J. H. RODGERS, W. F. SUTHERLAND, T. H. FENNER.

Eastern Representative: H. V. Tresidder; Ontario Representative: S. S. Moore; Toronto and Hamilton Representative; J. N. Robinson.

CHIEF OFFICES:

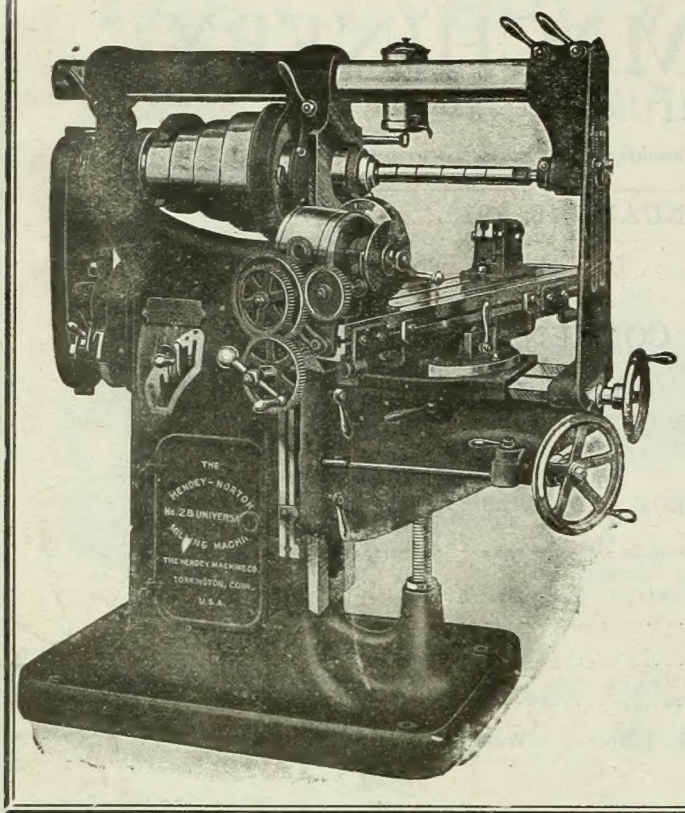
CANADA—Montreal, Southam Building, 128 Bleury Street, Telephone 1004; Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 1207 Union Trust Building, Telephone Main 3449.

GREAT BRITAIN—LONDON, The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C., E. J. Dodd, Director. Telephone Central 12960. Cable address: Atabek, London, England.

UNITED STATES—New York, A. R. Lowe, Room 620, 111 Broadway, N.Y., Telephone Rector 8971; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1204. A. H. Byrne, Room 900, Lytton Bldg., 14 E. Jackson Street, Chicago, 'Phone Harrison 1147.

SUBSCRIPTION PRICE—Canada, Great Britain, South Africa and the West Indies, $3.00 a year; United States $3.50 a year; other countries, $4.00 a year; Single Copies, 15 cents. Invariably in advance.

Anybody Can Operate This Miller



and Turn Out a Pile of Work so Simple to Operate is the

"HENDEY"

Skilled mechanics are scarce these days—but anyone can run a machine of its simplicity and turn out work accurately and fast without trouble.

All Feeds positive driven through gearings giving 18 changes.

This is the universal type—designed to handle all milling operations performed on machines of this character, either with regular equipment or by aid of attachments, which can be supplied for increasing efficiency and scope of machine.

Write for full description

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

INDEX TO ADVERTISERS

A
Aikenhead Hardware Co. 59
Algoma Steel Corporation 61
Allen Mfg. Co. 86
Allentown Experimental Works ... 75
Almond Mfg. Co. 84
Anderson's Efficiency Service 66
Anderson, Geo. A. 76
Arcwell Corp. of Canada 107
Armstrong Bros. Tool Co. 89
Armstrong Whitworth of Canada... 14
Atkins & Co., Wm. 6

B
Baird Machine Co. 90
Banfield, W. H., & Sons 76
Barnes, Wallace, Co. 64
Beaudry & Co., Inc. 89
Bertram & Sons Co., John 1
Bertrams, Ltd. 63
Betts Machine Co. 9
Bicknell-Thomas Co. 85
Blount Co., J. G. 78
Brantford Oven & Rack Co. 63
Bridgeford Mach. & Tool Wks. ... 9
Bristol Company 86
Brown, Boggs Co. 11
Budden, Hanbury A. 65
Butterefild & Co., Inc. 24

C
Canada Machinery Corporation .....
Outside back cover
Canada Metal Co. 14
Can. Blower & Forge Co. 12
Can. Driver Harris Co. 91
Can. Desmond-Stephan Co. 20
Can. Fairbanks-Morse Co. 32
Can. Ingersoll-Rand Co. 8
Can. S K F Co., Ltd. 28
Can. Steel Foundries 7
Canadian Aeroplanes, Ltd. 70
Carlyle, Johnson Mach. Co. 8
Chapman Double Ball Bearing Co.
Front cover
Cisco Machine Tool Co. 69
Classified Advertising 66
Cleveland Pneumatic Tool Co. 95
Coventry Chain Co. 110
Consolidated Press Co. 99
Curtis & Curtis 91
Cushman Chuck Co. 74

D
Davidson, Thos. 55
Davidson Tool Mfg. Corp. 26
Davis-Bournonville Co. 90
Deloro Smelting & Refining Co. 21
Dennis Wire & Iron Works Co. .. 89
Dominion Forge & Stamping Co. .. 29
Dominion Foundries & Steel 75
Dominion Iron & Wrecking Co. .. 68

E
Eastern Machine Screw Corp. 82
Electric Steel & Metals, Ltd. 7
Elliott & Whitehall 72
Elm Cutting Oil Co. 87
Enushevsky & Son, B. 90
Erie Foundry 99

F
Ferrachute Machine Co. 89
Fetherstonhaugh & Co. 65
Financial Post of Canada..... ....65, 103
Firth & Sons, Thos. 6
Ford-Smith Machine Co. 10
Foss Mach. & Supply Co., Geo. F...
Inside back cover
Frost Mfg. Co. 87
Fry's (London), Ltd. 22

G
Garlock-Walker Machy. Co. 68
Garvin Machine Co. 20
Geometric Tool Co. 57
Giddings & Lewis Mfg. Co. 89
Gilbert & Barker Mfg. Co. 105
Gisholt Machine Co. 31
Globe Engineering Co. 73
Gooley & Edlund 90
Grant Gear Works 87
Grant Mfg. & Machine Co. 92
Greenfield Machine Co. 88
Greenleafs, Ltd. 63
Gutta Percha & Rubber, Ltd. 82

H
Hamilton Gear & Machine Co. 80
Hanna & Co., M. A. 6
Hawkridge Bros. 64
Heald Machine Co. 25
Hendey Machine Co. 112
Hepburn, John T. 13
Hibbert & Phillips 90
Hinckley Mach. Works 89
Homer & Wilson 75
Hoyt Metal Co. 92
Hull Iron & Steel Foundries 75
Hunter Saw & Machine Co. 88
Hurlbut-Rogers Machinery Co. 86
Hyde Engineering Works 72
Hydraulic Machinery Co., The 79

I
Independent Pneumatic Tool Co. ... 92

J
Jacobs Mfg. Co. 85
Jardine & Co., A. B. 13
Johnson Machine Co., Carlyle 8
Jones & Glassco 16
Joyce-Koebel Co. 73

K
Kennedy & Sons, William 83
Knight Metal Products Co. 84

L
Landis Machine Co. 87
Latrobe Electric Steel Co. 12
Lynd-Farquhar Co. 14

M
Marshalltown Mfg. Co. 81
MacLean's Magazine 101
MacGovern & Co. 67
Manitoba Steel Foundries, Ltd. ... 87
Marsh Engineering Works, Ltd. ... 55
Marten Mach. 73
Matheson & Co., J. 66
Matthews & Co., Jas. H. 30
McDougall Co., Ltd., R. .....
Inside back cover
McLaren, J. C., Belting Co. 88
Mechanical Engineering Co. 106
Metalwood Mfg. Co. 30
Morse Chain Co. 17
Morse Twist Drill & Machine Co. 95
Morton Mfg. Co. 65
Mulliner-Enlund Tool Co. 79
Murchey Machine & Tool Co. 35

N
National Acme Co. 78
New Britain Machine Co. 97
Nicholson File 15
Niles-Bement-Pond....Inside front cover
Normac Machine Co. 63
Northern Crane Works 87
Norton, A. O. 87
Norton Co. 30
Nova Scotia Steel & Coal Co. ... 13

O
Oakey Chemical Co. 90
Ontario Lubricating Co. 91
Ott Grinder Co. 90

P
Page Steel & Wire Co. 89
Pangborn Corp. 89
Parmenter & Bulloch Co. 88
Peerless Machine Co. 63
Perrin, Wm. R. 99
Plewes, Ltd. 63
Positive Clutch & Pulley Works... 89
Pratt & Whitney.....Inside front cover

R
Racine Tool & Machine Co. 22
Reed-Prentice Co. 27
Rice Lewis & Son 71
Ridout & Maybee 65
Riverside Machinery Depot 67
Rockford Drilling Machine Co. 16
Rockwell Co., W. S. 86
Roelofson Machine & Tool Co. 19

S
Shipman & Co., Harold C. 65
Shuster Co., F. B. 88
Sidney Tool Co. 18
Silver Mfg. Co. 89
Simonds Canada Saw Co. 22
Skinner Chuck Co. 86
Smalley-General Co., Inc 18
Standard Fuel Engineering Co. ... 63
Standard Machy. & Supplies, Ltd.. 12
Standard Optical Co. 77
Starrett Co., L. S. 23
Steel Co. of Canada 3
Steinle Turret Machine Co. 91
Steptoe, John, Co. 16
Stoll Co., D. H. 86
Streeter, H. E. 7
Strong, Kennard & Nutt Co. 91
Swedish Steel & Importing Co. ... 4

T
Tabor Mfg. Co. 87
Taylor Instrument Co. 107
Taylor, J. A. M. 91
Thwing Instrument Co. 88
Tolland Mfg. Co. 80
Toronto Testing Laboratory, Ltd..... 88
Toronto Iron Works 86
Toronto Tool Co. 82
Trahern Pump Co. 97

U
Union Carbide Co. 82
United Brass & Lead, Ltd. 74, 88
United States Elec. Tool Co. ... 29

V
Vanadium-Alloys Steel Co. 4
Victoria Foundry Co. 72
Vulcan Crucible Steel Co. 4

W
Walton Co., The 84
Welland Machine & Foundries 73
Wells Bros. Co. of Canada 29
Wentworth Mfg. Co. 90
Whitcomb-Blaisdell Mach. Tool Co. 83
Whitman & Barnes Mfg. Co. 71
Wheel Trueing Tool Co. 87
Whiting Foundry & Equip. Co. ... 87
Whitney Mfg. Co. 20
Wilkinson & Kompass 90
Williams, A. R., Machinery Co. .55, 67
Williams & Co., J. H. 15
Willson & Co., T. A. 91
Willys-Overland, Ltd. 69
Wilson & Co., J. C. 97
Wilt Twist Drill Co. 5
Wood Turret Machine Co. 78
Windsor Tool & Machine Co. 81
Rice Lewis & Son 91

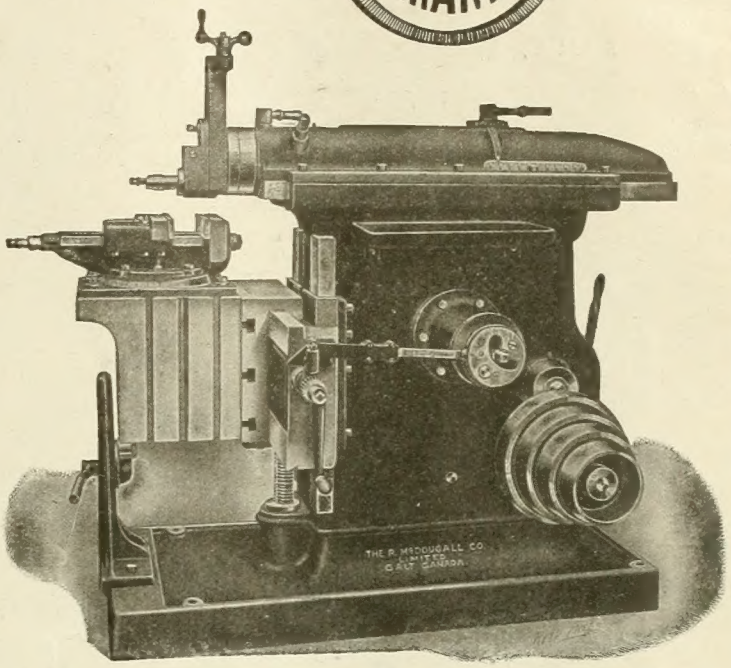
McDougall Shapers

These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work. Let us have your enquiry.

ARE-MAC-DEE IS A GUARANTEE



The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

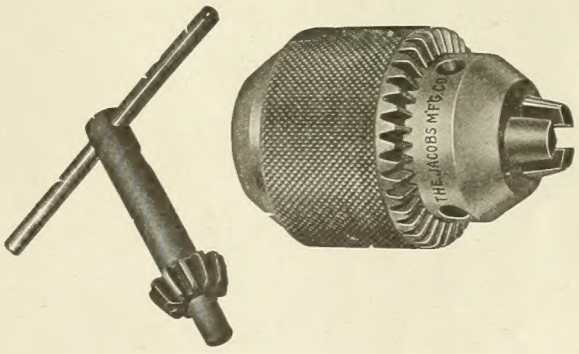
The Canadian Fairbanks-Morse Company, Limited

Sales Agents

Jacobs Improved *Drill Chuck*

Drills
Reamers
Vises
Taps and Dies
Corundum Wheels
Millers
Files and all supplies

THE GEO. F. FOSS MACHINERY & SUPPLY CO. LIMITED · MONTREAL · Foss



World Famous

In the secure grip of a Jacobs Chuck a drill cannot wobble; it cannot slip; it cannot come out with the shank chewed up. So it is not surprising that the highest production records accredited to certain well-known drills should have been made while in the firm grip of Jacob Chucks.

Write us for full particulars

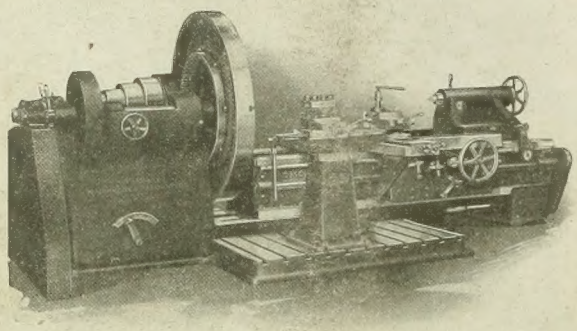
The Geo. F. Foss Machinery and Supply
COMPANY, LIMITED

305 St. James St. Montreal, Que.

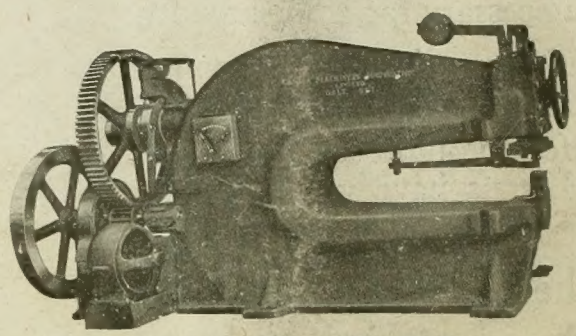
C.M.C.

Products of our Iron Tool Department.

For Machine, Locomotive and Railway Shops, Bridge, Boiler and Engine Works and Shipbuilding Plants.



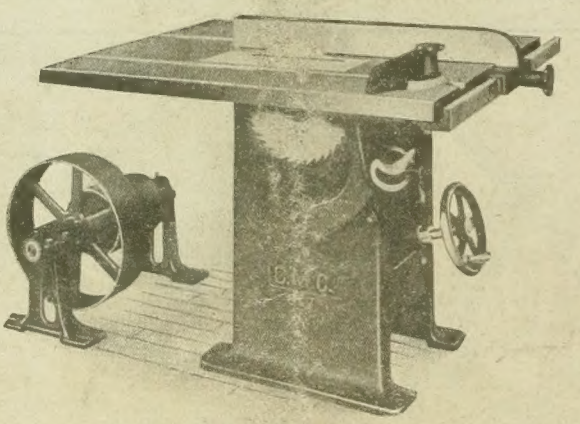
72″ Break Lathe



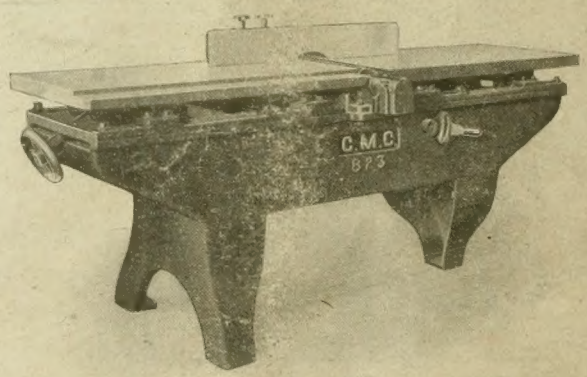
No. 4 Punching Machine

Products of our Wood-working Department.

For Planing Mills, Sash, Door, Box and Furniture Factories and Shipbuilding Plants.



No. 617 Variety Saw



No. 828 Buzz Planer

We are the largest manufacturers of iron and wood-working machinery in Canada.

Send us your enquiries.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms : BROCK AVENUE SUBWAY